Attachment 4: Project Description

The following project description for the development of a GWMP for the City of Santa Barbara includes: need for the project, goals of the project, location and area covered, as well as, referenced exhibits.

(1) Provide a complete, detailed description of the proposed project, including the goals of the proposal, needed facilities, their location and the area affected.

The City of Santa Barbara provides water service to most properties within the City limits, as well as, several unincorporated areas. The service area is approximately 20 square miles with a population of approximately 92,000.

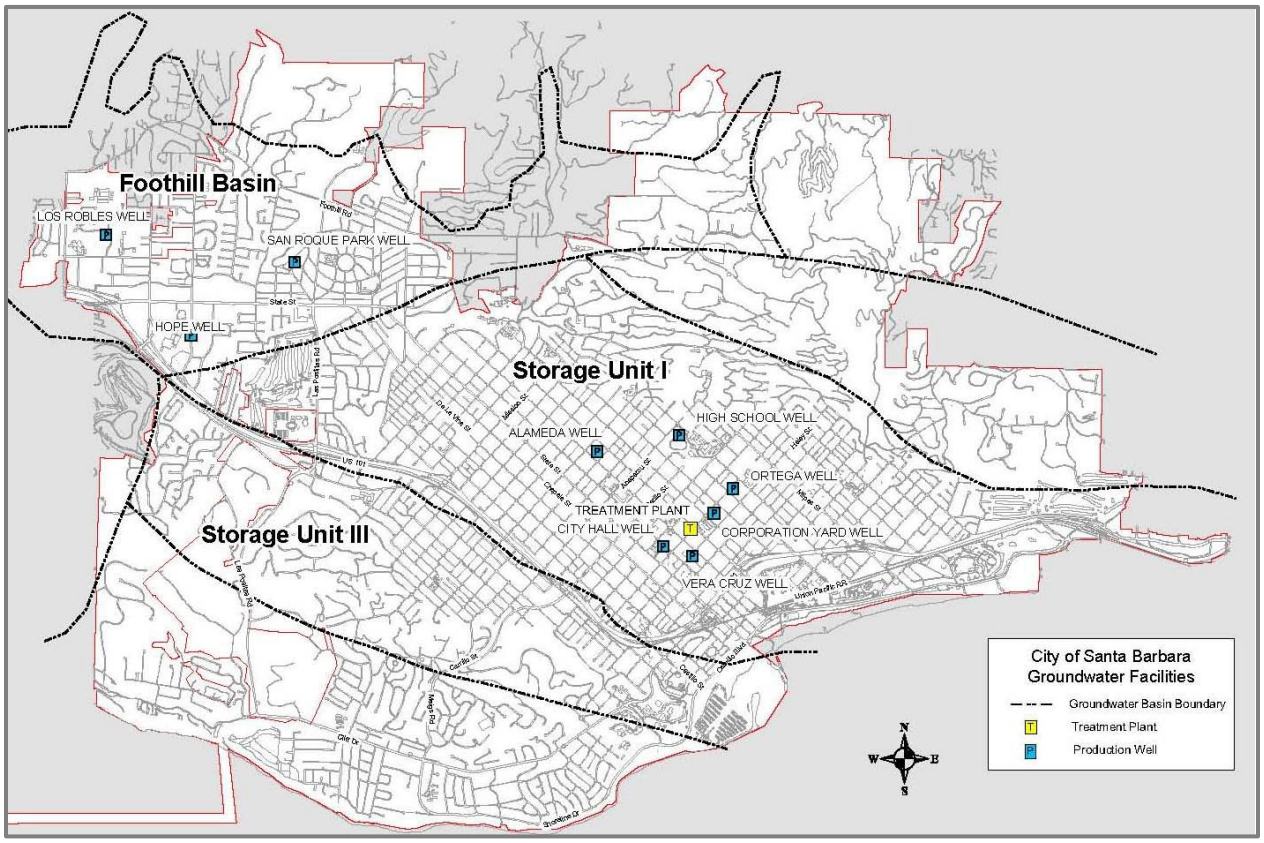
While groundwater supplies approximately only 10% of the overall water supply portfolio, it is a vital element of the City's overall water supply. Groundwater plays an important role in the City of Santa Barbara's water supply by helping to meet peak summer demand, backing up depleted surface water supplies during droughts, and providing emergency supply in the event of catastrophic interruption of the supplies from other sources.

The City of Santa Barbara actively manages its groundwater resources through a variety of methods, such as modeling to evaluate pumping scenarios and determine safe yields, water quality and quantity monitoring, replenishment via direct injection, and other related techniques. The City has been diligent in protecting its groundwater supplies and intends to formalize this role via development and adoption of a Groundwater Management Plan. The City of Santa Barbara's project for the LGA funds is for the development of an AB 3030 Groundwater Management Plan (GWMP) in conformance with California Water Code (CWC) Section 10750 et. seq.

Three major groundwater basins underlie the City of Santa Barbara. These are the Foothill Basin (upper State Street area) and Storage Units 1 and 3 of the Santa Barbara Basin (most of the urban area to the south) as shown in Figure 1 below. The City maintains nine (9) municipal supply wells, which draw from Storage Unit 1 and the Foothill Basin. Water quality in Storage Unit 3 is inferior and only planned for use in times of extreme drought.

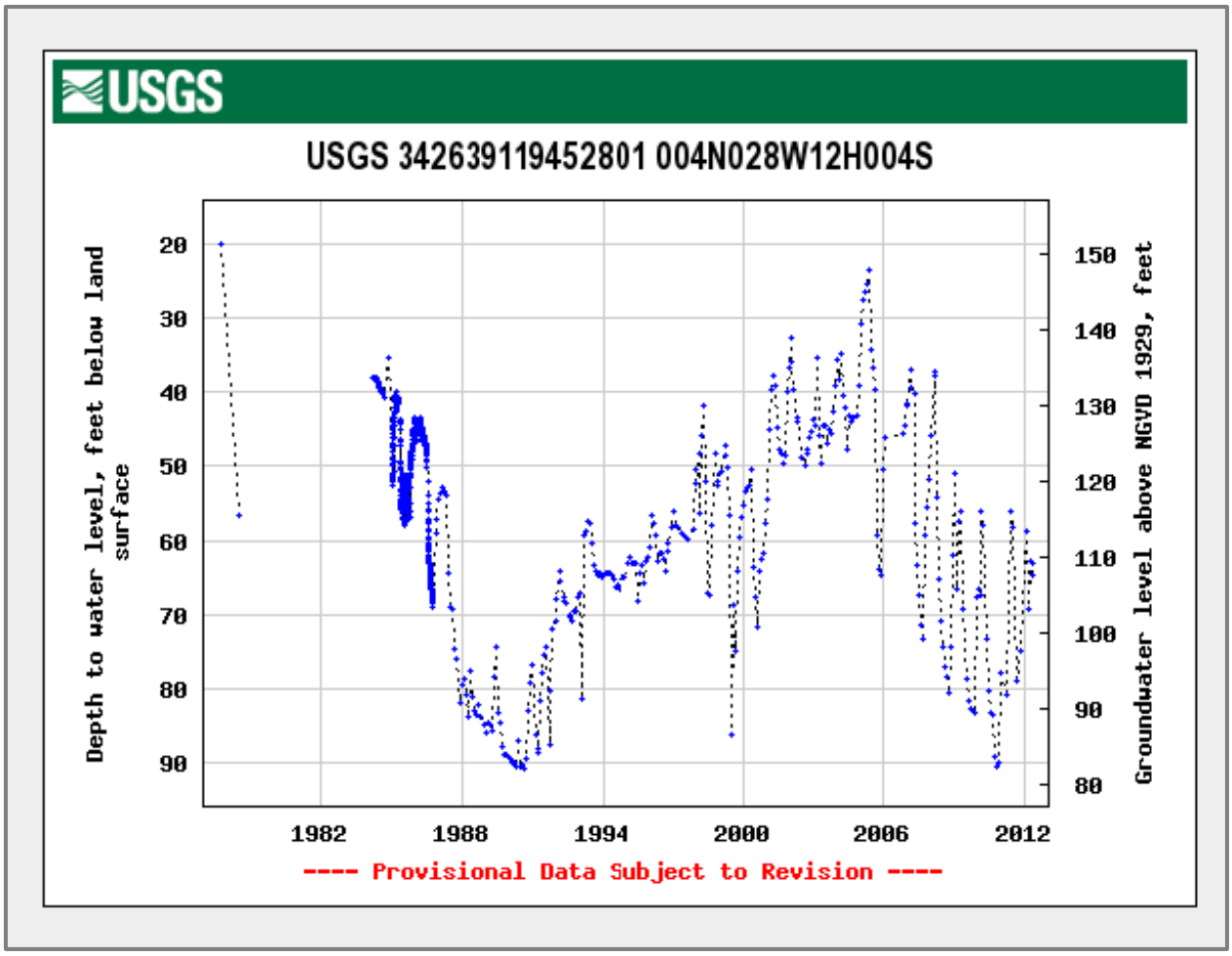
The Foothill Basin and Santa Barbara Basin comprised of Storage Unit 1 and Storage Unit 3 are located on the south coast of Santa Barbara County. These basins are bounded on the north by the foothills of the Santa Ynez Mountains, on the west by the Goleta groundwater basin, on the south by the Pacific Ocean, and on the east by the Montecito groundwater basin. Hydrologically, these basins are divided into three storage units by the Mesa and Mission Ridge faults. The Foothill basin encompasses about 4.5 square miles, the Santa Barbara Basins encompasses about 9 square miles (Storage Unit No. 1 - approximately 7 square miles and Storage Unit No. 3 - approximately 2.5 square miles).

Figure 1



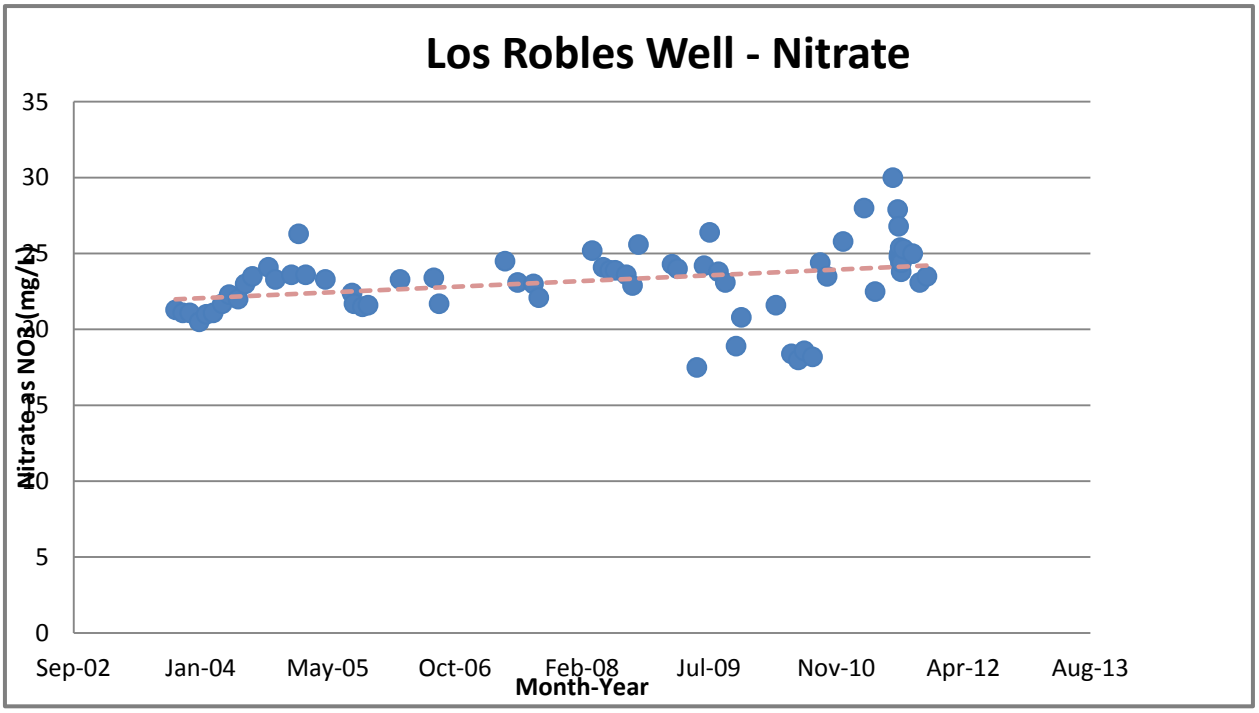
Proper management of groundwater supplies is becoming more urgent, due to emerging issues with water quality and quantity in the Foothill Basin. The hydrograph in Figure 2 shows the fluctuations in water level for the Foothill Basin for the past 20 years. The City is concerned that water levels in the Foothill Basin have reached levels in the recent past that are similar to levels experienced during the drought of the late 1980's and early 1990's. The City is not the only pumper within the basin; there are also private pumpers who have not provided data to the City previously. Information about the pumpage rates and volume are essential to effective groundwater management and the prevention of an overdraft. Therefore, the City plans to do extensive outreach to all pumpers within its supply basins to solicit better cooperative management of this resource. While participation from private pumpers has been limited in the past, they also have a vested interest in the status of groundwater supplies and the basins would be best served by the development of a GWMP that is inclusive of all stakeholders.

Figure 2



In addition, nitrate levels in the Foothill Basin have increased to levels that are beginning to cause concerns. The current regulatory limit on nitrate concentrations is 45 mg/L. Nitrate levels measured at the Los Robles production well have been recorded as high as 30 mg/L and historically average around 22 mg/L. As shown in Figure 3, the overall trend in concentration is rising and the City would like to actively investigate nutrient inputs to assess how best to manage this issue. Therefore, the development of the GWMP will include investigations on salt and nutrient sources. Ultimately, the City will develop a standalone Salt and Nutrient Management Plan (SNMP) in conformance with the SWRCB Plan components, however, the development of this GWMP will provide a source data and discussion that will inform the complete SNMP.

Figure 3



Finally, compounding the water quality problem identified above in the Foothill Basin, there is a high potential of saltwater intrusion into the Storage Unit 1 basin. During the severe drought of the late 1980's and early 1990's, seawater intrusion was experienced due to greater than usual pumping rates. As part of the GWMP, the City will be incorporating results from modeling efforts undertaken with the USGS to assess the vulnerability of the basin to saltwater intrusion and document the steps to be taken to preclude saltwater intrusion from occurring.

Purpose and Goals

The purpose of the GWMP is to (1) build upon the existing organization of local water purveyors, City Water Commission, GWMP Development Team, private landowners, and stakeholders to develop a better understanding of the groundwater setting and groundwater management opportunities in the Basins; (2) formulate groundwater management components to reflect the available information that emphasize the groundwater information and management aspects within the Basins; (3) identify projects and programs that can be implemented to improve long-term water supply reliability in the Basins; and (4) establish a regional approach to groundwater management that is accepted in the Basins and recognized by other local, state, and federal agencies and that can be used to pursue grant funding to implement projects that support improved groundwater management.

While many of the elements of a GWMP are currently underway by the City, there are two distinct needs to be addressed by the Plan. The first is the formal acknowledgment and organization of the management efforts within these basins into a single policy document. The other is greater involvement by other basin stakeholders. The extensive outreach planned to all pumpers within the basins will create a Plan that allows all users to collectively manage this resource.

The Santa Barbara GWMP will achieve the following goals:

- Consensus and team building among pumpers using the Foothill and/or Storage Units 1 and 3 Basins, including possible conjunctive use arrangements;
- Address possible overdraft issues in the Foothill Basin;
- Address water quality issues in the Foothill Basin;
- Provide a means of analyzing salt and nutrient inputs; and
- Create mitigation actions to reduce pollutant loading in Foothill and Storage Unit 1 basins.

Project goals include (1) alert stakeholders to the state of the Basins and the opportunity to keep the Basins in balance and avoid overdraft and potential saltwater intrusion; (2) complete and adopt the Plan, including the Basin Management Objectives (BMO's); (3) expand the existing groundwater monitoring program and annual reporting format for the Plan Area; (4) address water quality (nitrate) and quantity (declining water levels) issues to ensure long-term water supply reliability and quality in the Basins; and (5) address seawater intrusion issues in the Santa Barbara Basins.

Public Outreach

The purpose of the GWMP is to develop a management strategy that will preserve groundwater resources and ensure its availability to meet current and future water needs. The regional nature of the proposed project requires coordinated and regular communication among the local groundwater users, water purveyors, local agencies, interested parties, and other stakeholders in the Basin area.

The City of Santa Barbara will be the lead agency on the project and will develop the GWMP based on input from local water purveyors, a GWMP Development Team to be formed, private landowners, and interested stakeholders. The public process will include (1) inviting and encouraging public participation in the development of the GWMP; (2) conducting workshops for interested parties; (3) forming a Santa Barbara Groundwater Management Plan Development Team of interested parties and stakeholders; (4) holding regularly scheduled meetings of the GMWP Development Team to guide the development of the GWMP and to provide information to other stakeholders and interested parties about the progress being made; (5) publishing notices of GWMP Development Team meetings in the local newspaper at which action will be taken on the development of the GWDP; the notice of intent to develop the GWMP;

notice of the availability of the draft GWMP; and notice of adoption of the final GWMP; (6) providing meeting agendas and minutes as well as other announcements regarding the GWMP on the City's website and distributing this information at the meetings; and coordinate with local, state, and federal agencies. In particular, the City will actively solicit those within the basin that have groundwater wells for their inclusion in public meetings and participation in the GWMP Development Team.

(2) Demonstration of the long-term need and merit of the proposed project.

The City has been involved in management efforts for groundwater resources including ongoing efforts to recharge the basin and drilling additional wells inland to reduce the risk of seawater intrusion. In 1994, the City of Santa Barbara decisively increased its role in managing the groundwater resources in the Basins through preparation of the 1994 Long-Term Water Supply Program (LTWSP). However, the fundamental challenge for the City's water supply continues to be the ability to provide adequate water during an extended drought. Further, the water supply situation may also be affected by potential climate change impacts on hydrology and sea level, new constraints on deliveries of State Water through the Sacramento-San Joaquin Delta, a statewide water supply deficit with an accompanying legislative mandate for water use reduction, and increasing costs for water supply and operation of the water system.

Improved groundwater management is needed to develop necessary information to better understand the groundwater condition and potential benefits of implementing planned projects, such as demand management, water recycling, or conjunctive use projects; communicate the new information effectively to local landowners, stakeholders, and interested parties; and identify necessary actions needed to ensure long-term groundwater supply reliability and sustainability.

This project would facilitate coordinated regional groundwater management in the Foothill and Santa Barbara Basins, which will protect and preserve the groundwater resources and ensure their availability to meet current and future water needs.

This project will provide a number of benefits to the Basin through the completion of the work plan, which includes the following as noted in *Attachment 5, Work Plan*:

1. Develop an optimum GWMP for the Basins.
2. Understand the dynamic sustainability of the groundwater system.
3. Develop tools that will continually update information regarding the City's sustainable groundwater supply.
4. Identify optimal water-resource management strategies.
5. Estimate the current (2012) sustainable yield of the Basins.
6. Estimate the future sustainable yield of the groundwater basins.
7. Develop empirical methods to evaluate the current state of the groundwater basins.

8. Identify specific programs and projects to enhance optimum Basins production and water quality and meet the goals and objectives of the GWMP.
9. Develop optimum strategies for future construction of facilities including wells, pipelines, treatment systems and infiltration projects to holistically manage all phases of the urban water cycle.
10. Develop programs to educate the community on Basins issues including overdraft and poor water quality.
11. Develop programs and projects to reduce overdraft and manage water quality issues.
12. Evaluate potential nitrate sources including septic recharge and agricultural irrigation infiltration by conducting a nitrate-nitrogen, nitrate-oxygen isotope study.
13. Review existing programs and make recommendations to address septic system use, maintenance and operation.
14. Review existing Basins monitoring program and make recommendations to improve Basin monitoring.
15. Develop alternative methods for increased recharge (e.g. stormwater infiltration projects) and conjunctive use.
16. Review existing programs and make recommendations to address emergency or critical water shortage situations.
17. Develop programs for community involvement and outreach.
18. Develop programs to educate the community on continued water conservation and stewardship of the Basins.

(3) Describe how the applicant demonstrates collaboration with other local public agencies with regard to the management of the affected groundwater basin, including coordination with state and federal agencies.

The City has collaborated with the USGS on groundwater monitoring and groundwater studies as far back as 1968. This relationship has been maintained through the years, including cooperative agreements to share costs and staff time for long-term monitoring efforts. In addition, the City has partnered with the USGS on the development of the Multiple Objective Optimization Model (MOOM) and is currently funding an update and calibration of this model.

In addition, the City has agreed to serve as the monitoring entity for the Santa Barbara and Foothill Basins for the DWR CASGEM program. Monitoring locations and a work plan were submitted to the DWR in early 2011. The City looks forward to continued participation and support of the CASGEM program.

The proposed project builds upon the work completed over the last few years and establishes a framework to continue to improve regional groundwater management in the Basin. These efforts, listed below, demonstrate the interest, support, and continuing commitment of the individual agencies, stakeholders, and interested parties in protecting the Basins' groundwater resources.

- 1992 Water Conservation Program (CUWCC BMPs)

- 1994 Long-Term Water Supply Program
- 2009 USGS Groundwater Monitoring (MOOM Modeling) Contract (attached)
- 2010 City of Santa Barbara Urban Water Management Plan (attached)
- 2010 City of Santa Barbara Water Management Report (attached)
- 2011 City of Santa Barbara Water Management Report (attached)
- 2011 Long-Term Water Supply Program (attached)
- Annual Water Quality Reports and Newsletters (example Newsletter attached)
- City of Santa Barbara - CASGEM Groundwater Level Monitoring Plan (attached)
- 2011 Santa Barbara County Groundwater Report (attached)
- Ortega Groundwater Treatment Plant Rehabilitation (attached)
- La Cumbre Mutual Water Company Conveyance Agreement (attached).

These studies have resulted in additional groundwater data and a better understanding of the hydrogeologic setting of the Basins. This information will be used in the project to update the understanding of the groundwater resources in the Basins, and incorporate this information into a concise summary to support groundwater management planning efforts, including the continued efforts to investigate conjunctive use opportunities in the Basins with supplies from surface water and SWP.

Project conditions of the State Water Project (SWP) require the City to use SWP water to offset any demonstrated groundwater basin overdraft. Under the 2011 LTWSP, the City uses groundwater conjunctively with surface supplies, such that significant groundwater use only occurs when surface supplies are reduced. Basins are rested following periods of heavy pumping to allow water levels to recover.

The City recently conducted a comprehensive process to identify the optimal treatment scheme for the Ortega Groundwater Treatment Plan, which treats high levels of naturally occurring iron and manganese in groundwater pumped from the four downtown area wells at Ortega Park. A contract has been awarded with rehabilitation and plant upgrades scheduled to begin this year. The project's goal is to maintain availability of an important part of the City's water supply to provide back-up for depleted surface water supplies during drought, meet peak demands, and serve as an emergency water supply in the event of catastrophic supply interruptions.

(4) An explanation of how the ongoing use of the product(s) of the proposed project, including any required ongoing monitoring or maintenance, once grant funding is expended, will be funded.

Development of the GWMP will provide a strategy of programs and projects to enhance the Foothill and Santa Barbara Basins. It is the City's desire to develop a GWMP that will involve further studies that will contribute to the Basins, focusing on improving coordination of groundwater basin management, and conducting groundwater studies. The information developed from this project will be used to develop a

baseline set of information for use in future studies, groundwater monitoring, and continued groundwater management efforts. Many of these data collection and management efforts will continue to be funded, as they have in the past, by a combination of sources, primarily from City revenues. Additional grant funding may be pursued for specific projects such as groundwater modeling or groundwater investigation, but a majority of the revenues are provided by the City's Water Fund.

(5) Describe measures that will be used to evaluate data and mechanisms to adapt the new knowledge obtained in the improvement in groundwater management consistent with the goals and objectives of the GWMP or other groundwater management program.

The City of Santa Barbara has long recognized the value in collecting and using data to support efforts to improve groundwater management in the Basins. The Work Plan provided in *Attachment 5, Work Plan* describes the measures to be used to evaluate data and mechanisms to incorporate the data into the GWMP. For example, the City will continue to monitor and report groundwater levels under the Groundwater Elevation Monitoring (CASGEM) program, BMO's will developed in the GWMP with quantitative thresholds set for each BMO to ensure the beneficial uses of the Basins are preserved and undesirable effects (e.g., seawater intrusion) are mitigated. Further, the City initiated a 3-year project with the USGS to update their Multiple Objective Optimization Model (MOOM) and added a 3-dimensional water quality component for more accurate assessment of seawater intrusion. Finally, the BMOs will be tracked by monitoring groundwater levels and quality in the Basins to determine the type and magnitude of the local groundwater issues and identify potential projects and management activities to address these issues.

(6) An explanation of how the groundwater management plan will be implemented and how it will be funded.

The City will authorize preparation of the GWMP through adoption of the City Council Resolution as discussed in Task 1.1 and Task 1.2 of Attachment 5, Work Plan. Development of GWMP will include quality assurance and quality control measures that will result in high-quality information and data being produced to develop an optimum GWMP to enhance groundwater management of the Basins.

A qualified consultant will be used to complete the scope of work, which includes planned quality assurance checks of the technical work at various stages of the project. Multiple levels of QA/QC will be included throughout the preparation of the technical work products and development of the GWMP. Specific QA/QC measures are outlined in *Attachment 8, Quality Assurance*. Development of the GWMP would be funded by this request for grant funds under the LGA grant program. Ongoing projects and programs developed under the GWMP would continue to be funded, as they have in the past, by a combination of sources, primarily from City revenues. Additional grant funding may be pursued for specific projects such as groundwater modeling or groundwater investigation, but a majority of the revenues are provided by the City's Water Fund.

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2009 USGS Groundwater Monitoring (MOOM Modeling) Contract

United States Department of the Interior

U.S. GEOLOGICAL SURVEY

California Water Science Center
6000 J Street, Placer Hall
California State University
Sacramento, California 95819-6129
Phone: (916) 278-3000 Fax: (916) 278-3070
http://water.wr.usgs.gov

March 6, 2012

Ms. Theresa Lancy, Water Resources Supervisor
City of Santa Barbara
Public Works Deptartment
Post Office Box 1990
Santa Barbara, CA 93102

Dear Ms. Lancy:

This letter confirms discussions between our representative staffs, concerning the continuation of the existing water-resources program between the City of Santa Barbara and the U.S. Geological Survey (USGS) California Water Science Center for the period of our existing Investigations Program agreement for the period of November 1, 2009 to October 31, 2013.

The objectives of this study are to: (1) understand the dynamic sustainability of the groundwater system; (2) develop tools that will continually update information regarding the city's sustainable groundwater supply; and (3) identify optimal water-resource management strategies. This study will consist of four phases: (1) estimate the current (2010) sustainable yield of the Santa Barbara groundwater basins; (2) evaluate the future sustainable yield of the groundwater basins; (3) develop empirical decision rules to evaluate the current state of the groundwater basins; and (4) present the results in an interpretive report(s).

This is the second year of a three-year project. To date, the USGS has compiled data from the City; redefined the basement geometries of Storage Unit I, III, and Foothill Basin; and constructed a lithologic database of the basins. The database was used to develop a geologic model of the basins describing the vertical and lateral distribution of the lithologies [e.g. "fine" (clay, silt, hard pan, mud, sandstone, silt, shale, siltstone, and loam) and "coarse" (boulders, cobbles, conglomerate, gravel, and sand)] at 10-ft intervals.

In addition to the work described above, the groundwater-flow model published by Freckleton and others (1998) was updated. The model domain was modified per the geologic data and the lithologic data (i.e., fine and coarse) were used. Modeled faults include the Mesa, East More Ranch, and Northeast More Ranch faults and two unnamed faults in the Foothill Basin. Pumping data were updated through 2008. The flow model is running and calibration is proceeding. Once the flow model is close to calibration, the density-dependent solute-transport model will be added and the coupled model will be calibrated together.

Ms. Theresa Lancy, Water Resources Supervisor, City of Santa Barbara

The total of the amended proposed portion of this cooperative water resources program for Federal Fiscal Year (FFY) 2012 is $191,200. Of this total, the City of Santa Barbara will contribute $136,100, and, subject to the availability of Federal Matching Funds (FMF), the USGS will contribute $55,100.

Enclosed are two copies of Joint Funding Agreemnt (JFA) 10W4CAD03710, M3 for your approval. Work performed with funds from this agreement will be conducted on a fixed-price basis. If you are in agreement with this proposed amendment to the program, please return one copy of the JFA with original signatures to our office for further processing. The first copy of the JFA is for your files. The USGS is required to have an agreement in place prior to any work being performed on a project

If you have any questions concerning this program described above, please contact Tracy Nishikawa at (619) 225-6148. If you have any administrative questions, please contact Irene Rios, in our San Diego Office, at (619) 225-6156.

Sincerely,

Eric G. Reichard
Director, USGS California Water Science Center

Enclosures
Cc: Tracy Nishikawa, USGS CAWSC

Local Groundwater Assistance Grant Application
Status of Groundwater Management Plan

2010 City of Santa Barbara Urban Water Management Plan

City of Santa Barbara

Urban Water Management Plan

2010 Update – Adopted June 2011

Prepared by the City of Santa Barbara, Water Resources Division,
pursuant to California Water Code, Section 10631

Adopted by the Santa Barbara City Council on June 14, 2011
as Agenda Item No. 15

City Council:

Helene Schneider, Mayor
Grant House, Councilmember
Dale Francisco, Councilmember
Frank Hotchkiss, Councilmember
Michael Kathleen Self, Councilmember
Harwood "Bendy" White, Councilmember
Randy Rowse, Councilmember

Board of Water Commissioners:

Landon Neustadt, Chair
Barry Keller, Vice-Chair
Russell Ruiz, Commissioner
James Smith, Commissioner
Bill Thomas, Commissioner

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City of Santa Barbara

Urban Water Management Plan

2010 Update

Section 1: Plan Preparation

This Urban Water Management Plan (UWMP) has been prepared pursuant to the requirements of the California Water Code, Section 10631. Preparation was by staff of the Public Works Department in consultation with the City's Board of Water Commissioners and staff of the Community Development Department. The UWMP updates the previous plan updated by the City in December 2005. The approach used was to present a concise summary of the City's water supply system, updated to reflect changes since 2005 and to conform to new reporting requirements of State law. Much of the updated plan is based on the analysis completed in support of the *Plan Santa Barbara* process (General Plan update) and a concurrent update of the City's Long Term Water Supply Plan (LTWSP).

After numerous public meetings to consider pertinent information, the plan was reviewed by the Board of Water Commissioners on May 9, 2011, at which time the Commission unanimously voted to support staff's efforts to complete the plan in compliance with State UWMP requirements and in conformance with the City's updated LTWSP. A public hearing, with public notice pursuant to California Government Code Section 6066, was held before the City Council as Agenda Item No. 15 on June 14, 2011, at which time the Council voted unanimously to adopt the plan. Documentation of public noticing and City Council action is included in Appendix A.

Following are the more commonly used abbreviations and volumes in this plan:

Abbreviations	
AF	Acre-feet (1 AF = 325,851 gallons, or 435.6 HCF)
BMP's	Best Management Practices of the CUWCC
CUWCC	California Urban Water Conservation Council
DOF	California Department of Finance
GPCD	Gallons per Person, per day
HCF	Hundred Cubic Feet (1 HCF = 748 gallons)
LTWSP	City of Santa Barbara "Long Term Water Supply Plan," the City's water supply policy document, updated in conjunction with this Urban Water Management Plan update.
MGD	Million Gallons per Day
SWRCB	California State Water Resources Control Board
USGS	United States Geological Survey

Except where noted, annual data in this plan are based on fiscal years, running from July through June. In some cases existing data are tabulated in calendar years or water years (October through September) and are not practical to convert. However, all calculations related to determination of baselines and urban water use targets pursuant to the Water Conservation Act of 2009 (SB7x-7) are based on fiscal years.

Community Involvement and Interagency Coordination

Water supply management has been a key issue in the effort to update the City's General Plan, which began in 2005. Updates of the City's LTWSP and UWMP were conducted in conjunction with this widely publicized effort. In addition, Water Supply Management Reports are presented annually to the Water Commission and City Council. All meetings of the City Council and Water Commission are publicly noticed and agenda packets are posted online for easy public access. Following is a tabulation of public outreach efforts and dates related to the development of the City's updated UWMP, and the LTWSP, which was developed to support both the General Plan update and the UWMP update.

Table 1
Public Outreach in Development of UWMP Update

Date	Activity
January 2005	Planning Commission: General Plan Update - Conditions, Trends and Issues: Water Supply
July 2008	Planning Commission: Plan Santa Barbara – Water Supply Issues
April 2009	Water Commission: In Progress Review: Developed Water Supply Sources
June 2009	City's water newsletter features an article on the ongoing process of updating the Long Term Water Supply Plan and Urban Water Management Plan; mailed to each household in the City.
July 2009	Water Commission: Presentation of Estimated Annual Water Supply – Existing Conditions
October/November 2009	Water Commission: Review of Water Supply Planning Study (Carollo Engineers)
March 2010	Water Commission: Appointment of *Plan Santa Barbara* Subcommittee
April 2010	Water Commission: Recommendation on water supplies section of *Plan Santa Barbara* Draft EIR
September 2010	Water Commission: Presentation on Water Conservation Technical Evaluation (Maddaus Water Management)
October/November 2010	Water Commission: Demand Planning Issues and Demand Target for Water Supply Planning
December 2010	Water Commission: Review of Proposed 6-year Drought Planning Analysis
February/March 2011	Water Commission: Review Initial Drafts of LTWSP
April 2011	Joint City Council – Water Commission Work Session on LTWSP; and Commission Recommendation to Approve LTWSP
April 2011	Planning Commission Meeting – Water Supply Planning Briefing
May 2011	Water Commission: Review draft of UWMP
May 25, 2011	Posting of final draft UWMP on City Internet web site
May 25, 2011	Draft UWMP posted on City website for public comment, with notification to key community organizations (see below)
May 24/29/31, 2011	Publication dates for Notice of Public Hearing on UWMP
June 14, 2011	Public Hearing and UWMP Adoption

It was during these various meetings that key technical and policy issues were addressed by City Councilmembers, Commissioners, and members of the public. These issues included:

- Projection of new development, and associated water use, in conjunction with the City's

General Plan Update process;

- Updated water demand factors, by which future water use was estimated; and establishment of a target demand for long term planning purposes;
- Projected demand reductions from ongoing water conservation program measures;
- Review of updated economic and technical information related to proposed policies on the role of the City's desalination facility and consideration of water banking and/or purchases as alternatives to desalination;
- Effects of the ongoing economic crisis on City water demand;
- Discussion of the 2009 State Water Project Delivery Reliability Report and its implications for City water supply;
- Projected sedimentation impacts on surface water reservoirs;
- Review of long standing assumptions as to groundwater availability;
- Assessment of potential additional recycled water uses and policy on amounts of potable water blending to improve recycled water quality;
- Consideration of a policy to plan for a 6-year critical drought period, as opposed to historical frequency of 5 years;
- Evaluation of potential for extraordinary short-term demand reductions as a tool for addressing a critical drought period; and
- Formulation of a Long Term Water Supply Plan and an Urban Water Management Plan that will cost effectively meet the requirements of the Water Conservation Act of 2009.

Upon completion of the numerous public meeting identified above, the City prepared final drafts of the 2010 Urban Water Management Plan and the companion Long Term Water Supply Program. A number of key community organizations and affected agencies were notified of the availability of the May 24, 2011 drafts of the two documents. Those notified include:

- City of Santa Barbara, Community Development Department
- County of Santa Barbara, Clerk of the Board
- Central Coast Water Authority
- Goleta Water District
- Montecito Water District
- Carpinteria Valley Water District
- Santa Ynez River Water Conservation District, Improvement District No. 1
- Santa Ynez River Water Conservation District
- Santa Barbara County Water Agency
- Citizens Planning Association
- U. S. Bureau of Reclamation
- Hispanic Chamber of Commerce
- Santa Barbara Restaurant and Lodging Association
- Channel Islands Chapter California Landscape Contractors Association
- Allied Neighborhood Association
- Citizens Planning Association
- American Institute of Architects
- Community Environmental Council
- Santa Barbara Board of Realtors
- Santa Barbara Chamber of Commerce

- Downtown Organization
- Milpas Community Association

No additional feedback was received from the organizations contacted.

The City has coordinated with the Central Coast Water Authority on information about forecasted deliveries of water from the State Water Project.

Lake Cachuma is the City's primary source of water supply and the City coordinates regularly with the Cachuma Operation and Maintenance Board (COMB), the Joint Powers Agency that operates portions of the Cachuma Project and coordinates with the U.S. Bureau of Reclamation on contract issues and deliveries of project water. The Board meets monthly, as does an Operating Committee consisting of the Member Unit managers and the COMB General Manager.

The City has also been an active participant in the development and adoption of the 2007 Santa Barbara Countywide Integrated Regional Water Management Plan, and is currently participating in an update of the plan.

Current collaborative efforts among various parties on the Santa Ynez River to implement the 1989 Upper Santa Ynez River Operations Agreement are another example of regional cooperation to manage water resources.

At the June 14, 2011 public hearing, a representative of the local avocado growers acknowledged the City Council's support of agriculture and the chair-elect of the City Water Commission conveyed the Commission's support for adoption of the plan as presented.

Copies of the plan were sent to the office of the Clerk of the Board, County of Santa Barbara and the California State Library at the time of submittal of this plan to the Department of Water Resources. There are no other cities in which the City of Santa Barbara provides water.

A copy of the plan will be posted on the City's Internet site within 30 days of the filing date and will be available for review at the City Water Resources Division offices during normal business hours.

Contact Information

This plan was prepared by the Water Resources Division, Public Works Department, City of Santa Barbara, under the management of Rebecca Bjork, Water Resources Manager. The preparation was coordinated by Bill Ferguson, Water Resources Supervisor, who can be reached by email at BFerguson@SantaBarbaraCA.gov or by phone at (805) 564-5571.

Section 2: System Description

The City of Santa Barbara operates the water supply system that serves most of the properties within the City limits (except for the City airport, which is served by the Goleta Water District), and selected areas located outside the City limits. A map of the water service area is included as Appendix B. The following information gives a general description of the service area and water system:

Service Area Population:

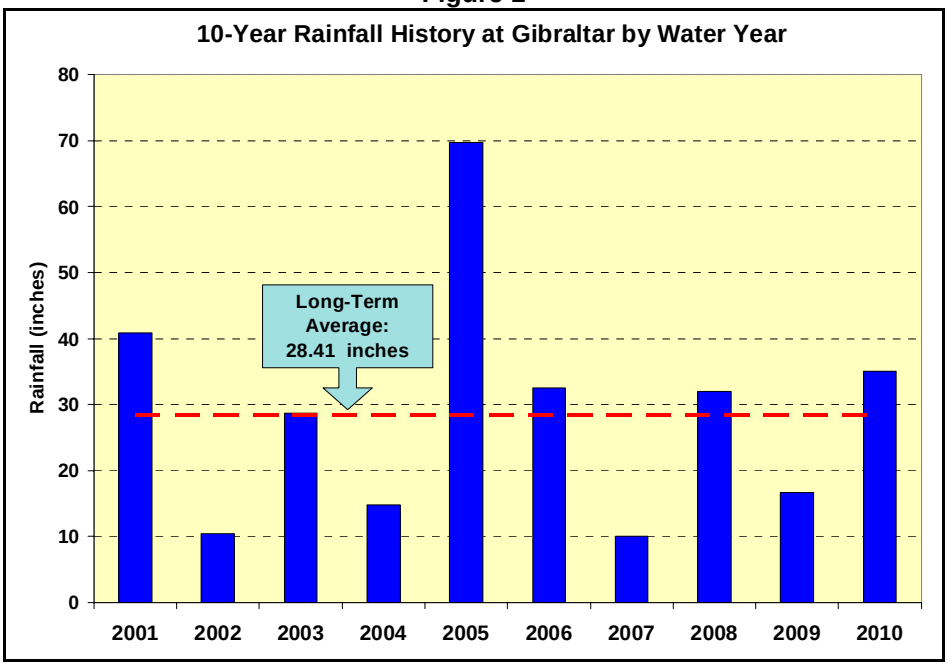
	Current	Projected[1]			
	2010	***2015***	***2020***	***2025***	***2030***
Total Service Area:	91,416	93,091	94,766	96,441	98,116

[1] Projections based on 2010 State of California Department of Finance population estimates for the City of Santa Barbara, adjusted using U.S. Census Bureau data to add out-of-City areas served by City distribution system and to deduct in-City areas not served by City distribution system. Growth assumptions from City of Santa Barbara *Plan Santa Barbara* (General Plan update) process projecting population increase of 6,700 persons through 2030.

Elevation of Service Area: 0' - 1,400'

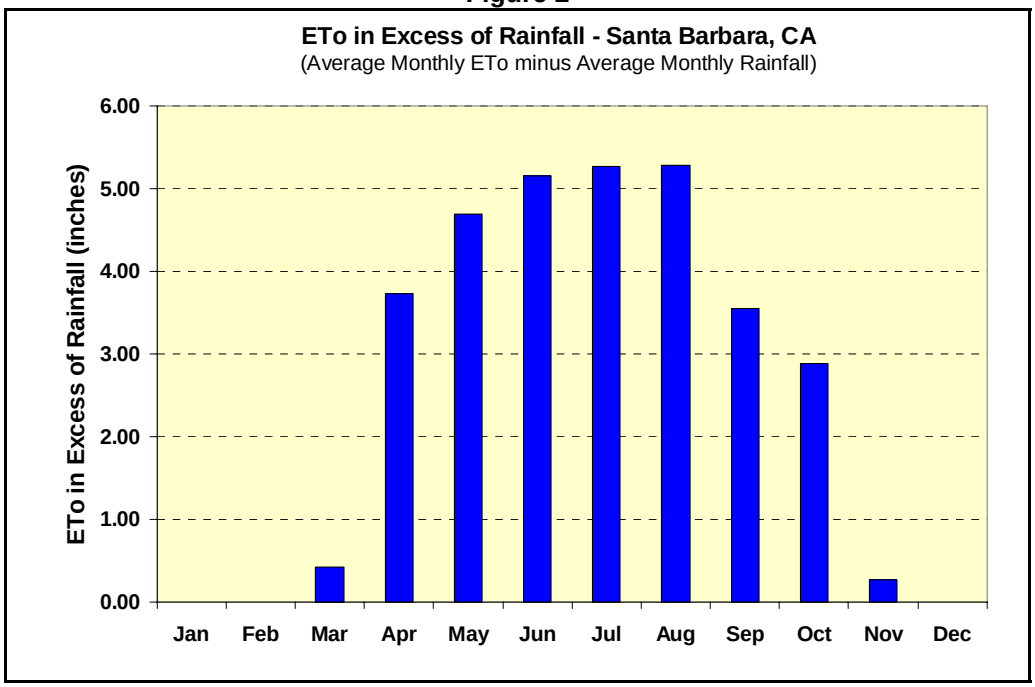
Average Annual Rainfall (see Figure 1 for data for past 10 years at Gibraltar):
Santa Barbara (1960-2010): 18.61"
Gibraltar Reservoir (1960-2010): 28.41"

Figure 1



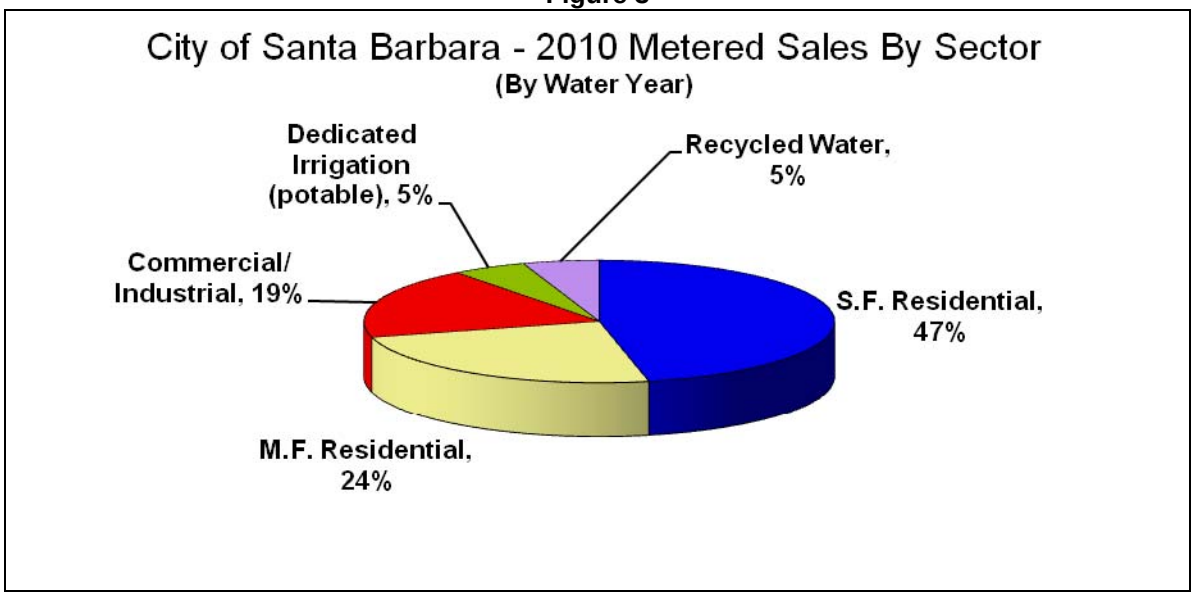
Average Annual Evapo-transpiration Rate: 44.6”
Average Annual ETo in Excess of Rainfall: 31.3” (See Figure 2 for monthly breakdown.)

Figure 2



Demographic Characterization: Figure 3 uses 2010 water sales by sector to give an overview of the demographic makeup of the City's water service area. Residential use is predominant. The City is largely built-out, though it should be assumed that infill and redevelopment will continue at roughly the same rate as in the recent past, resulting in a small amount of new demand in the residential and commercial sectors. The relative distribution of demand by sector is expected to remain very similar to current conditions. The City has completed environmental analysis of a proposed General Plan Update process which sets the range of projected demand growth from new development.

Figure 3



Water System Facilities:

	Potable Water System	Recycled Water System
Miles of Distribution Main:	320	14
Balancing Reservoirs:	13	2
Pumping Stations:	12	2
Production Wells:	9	NA
Water System Employees:	72	

Wastewater System Description:

Collection system:	277 miles of sewer pipe 9 lift stations
Wastewater Treatment Plant:	
Design Capacity:	11 MGD
Average 2010 Flow:	7.7 MGD
Recycled Water Demand:	1.0 MGD
Treatment Level:	Secondary, with tertiary treatment of recycled water
Disposal Method:	Recycled to landscape irrigation and toilet flushing in public restrooms, with balance discharged to Pacific Ocean. (See Recycled Water information in Section 4 for more details on use of recycled water)
Wastewater System Employees:	58

The water and wastewater systems are administered by the Water Resources Division of the City's Public Works Department. The water demand projection was coordinated with the City's Community Development Department as a part of the process to update the City’s General Plan.

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Section 3: System Demands

Historical Demand

The City's water demand history is shown in Figure 4. Produced water is used as the traditional indicator of demand since water is produced to meet the demand. With construction of the 1989 Water Reclamation Project, the City began tracking total water demand based on production to the potable water and recycled water distribution systems. The combined total is referred to as "system" demand. Figure 5 shows metered sales by sector for 1987 to present. Both figures illustrate the demand response to severe drought in the late 1980's and early 1990's, and partial recoveries of demand once drastic measures were no longer needed. Variations from 1998 onward are primarily the result of year-to-year variations in weather as illustrated in Figure 6.

Figure 4

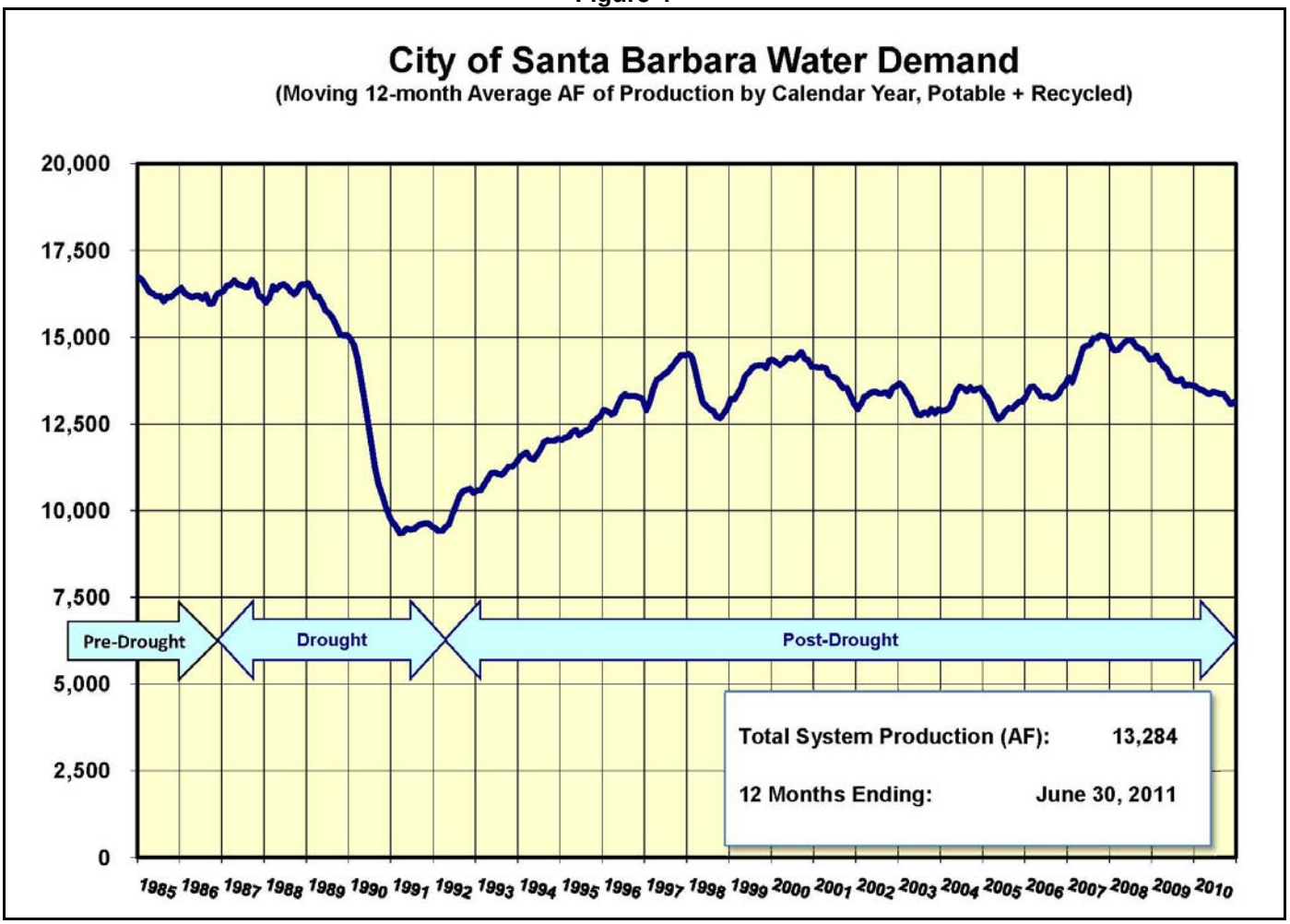


Figure 5

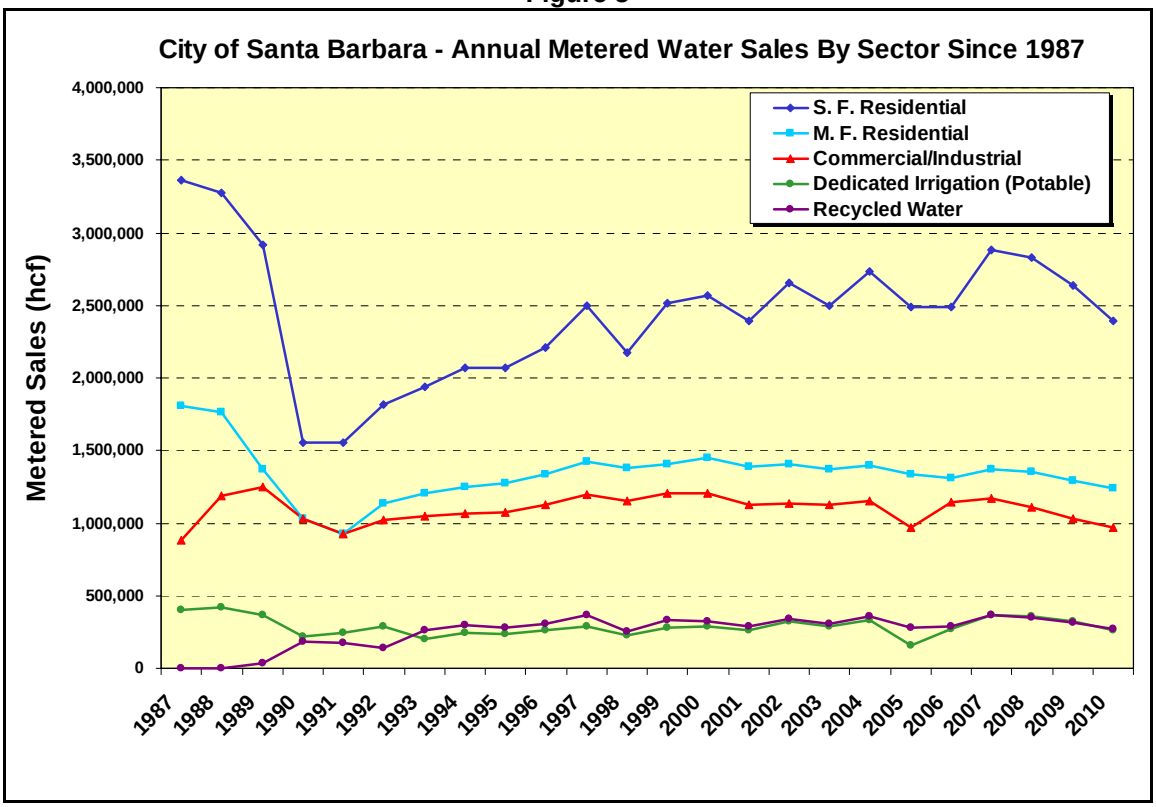
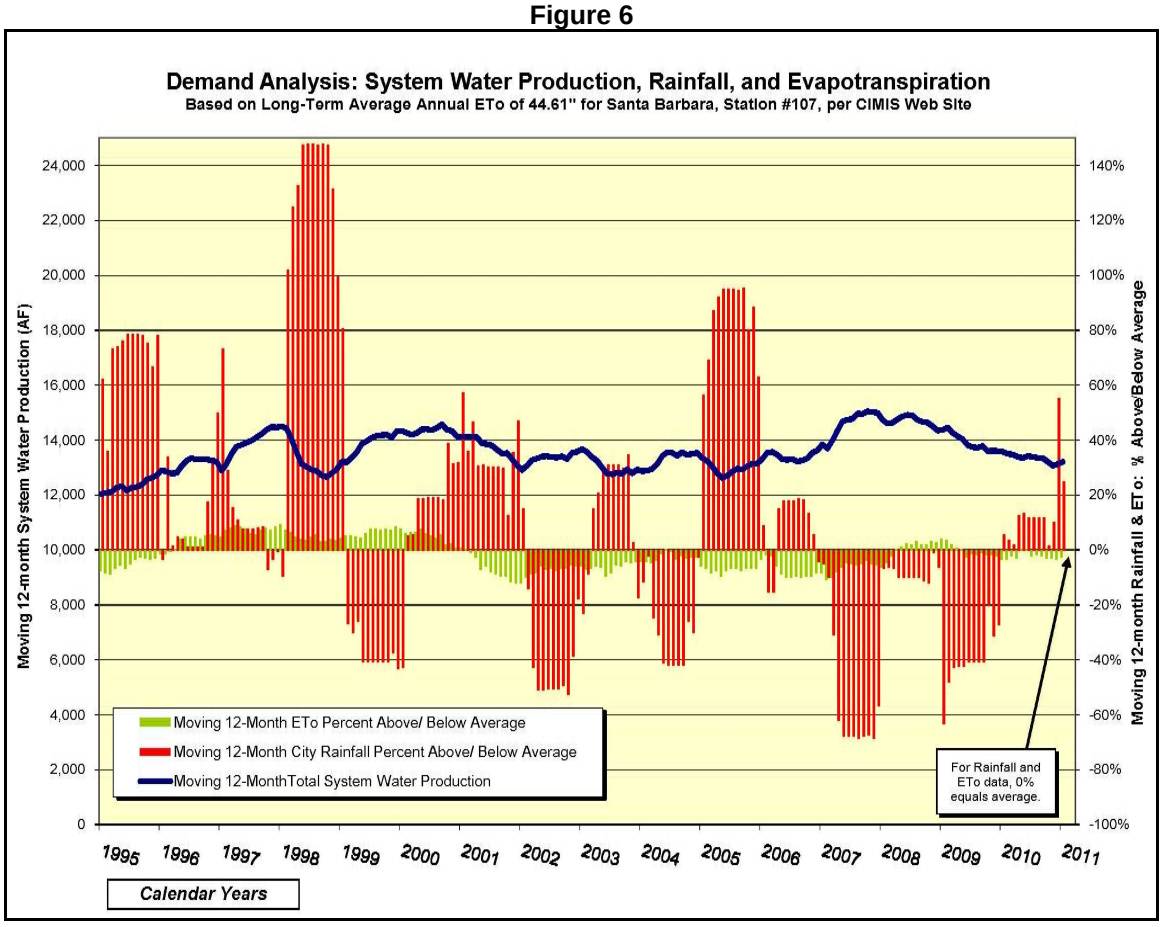


Figure 6



Baselines and Targets

Pursuant to the Water Conservation Act of 2009 (SB7x-7) and related official methodologies, baseline per capita water use is required for two base periods, a 10 to 15 year period and a 5-year period. Recycled water deliveries for 2008 equal 5.9% of total deliveries. This is below 10%, thereby requiring use of a 10-year base period. Required data for the 10-year and 5-year base periods are shown in Table 2 and Table 3 respectively, calculated individually for the City of Santa Barbara water service area. A map of the City's service area is included as Appendix B. The service area includes in-City census tracts and out-of-City census tracts served by the distribution system, and excludes in-City census tracts not served.

Table 2
Base Daily Per Capita Water Use: 10-Year Range

Base Period Year		Distribution System Population	Daily System Gross Water Use (per UWMP Guidebook Definition)		Annual daily per capita water use (gpcd)
Sequence Year	Fiscal Year		(AFY)	(mgd)	
Year 1	2000	92,229	13,792	12.3	134
Year 2	2001	92,807	13,344	11.9	128
Year 3	2002	93,390	12,879	11.5	123
Year 4	2003	93,267	12,223	10.9	117
Year 5	2004	93,315	13,073	11.7	125
Year 6	2005	92,882	12,528	11.2	120
Year 7	2006	91,946	12,860	11.5	125
Year 8	2007	91,934	14,106	12.6	137
Year 9	2008	92,776	14,432	12.9	139
Year 10	2009	93,017	13,576	12.1	130
				Base Daily Per Capita Water Use:	**128**

Table 3
Base Daily Per Capita Water Use: 5-year Range

Base Period Year		Distribution System Population	System Gross Water Use		Annual daily per capita water use (GPCD)
Sequence Year	Fiscal Year		(AFY)	(mgd)	
Year 1	2006	91,946	12,860	11.5	125
Year 2	2007	91,934	14,106	12.6	137
Year 3	2008	92,776	14,432	12.9	139
Year 4	2009	93,017	13,576	12.1	130
Year 5	2010	91,416	13,276	11.9	130
				5-Year Base Daily Per Capita Water Use:	**132**

Population values in the base period tables are based on California Department of Finance (DOF) data for the City of Santa Barbara. City population for 2000 was compared with U.S. Census Bureau data to confirm approximate equality. Adjustments to add out-of-City population served by the City distribution system and deduct in-City population not served by the City system were made using 2000 census block data. The percentage increment of total population served in excess of the official City population value was calculated for 2000 and applied to DOF data for subsequent years. Year-to-year variations are partly explained by adjustments made by DOF from time to time.

Gross Water Use values are calculated as Total Water Received, including local surface water and groundwater, imported State Water for City use via the Central Coast Water Authority (CCWA), receipt of State Water for conveyance to La Cumbre Mutual Water Company (LCMWC). Deducted from this are agricultural deliveries, net exports to Goleta Water District (GWD), State Water conveyance to LCMWC, and export to long-term storage (groundwater injection and recharge). Consistent with State methodologies, calculation of Gross Water Use includes potable water used for blending (as discussed below), and excludes the recycled water component of deliveries to recycled water customers. A sample calculation for FY 2010 is shown in Table 4. Historical calculations for 1996 to present are shown in Table 5.

Table 4
Sample Calculation of Gross Water Use for FY 2010 (AFY)

City Supplies:		
Cachuma Project	7,637	
Gibraltar Reservoir	2,933	
Mission Tunnel	1,220	
Devils Canyon Creek	0	
Groundwater	1,164	
Desalination	0	
Subtotal City Supplies:		12,954
Imported Supplies (SWP via CCWA):		541
State Water Received for LCMWC:		947
Total Water Received:		**14,442**
Less Agricultural Deliveries		106
Less Net Exports to GWD		38
Less State Water Conveyance to LCMWC		947
Less Export to Long Term Groundwater Storage		75
Gross Water Use:		**13,276**

Based on use of DWR's Urban Water Use Target Method #3 and location in the Central Coast Hydrologic Region, the urban water use target is 95% of the region target, or 117 GPCD. Table 3 shows calculation of the 5-year base period, resulting in a Base Daily Per Capita Water Use of 132 GPCD, 95% of which is equal to 125 GPCD. Since the urban water use target of 117 GPCD is not greater than 125 GPCD (i.e. it results in a targeted reduction of at least 5% compared to the 5-year base period) the target of 117 GPCD is confirmed. The interim target for 2015 is calculated as:

(128 GPCD Base Daily Water Use + 117 Urban Water Use Target) / 2 = 123 GPCD.

Table 5

Tabulation of Historical Gross Water Use

Water into distribution system; less net exports, diversions to long-term storage (groundwater injection), and agricultural deliveries

Year	Cachuma	Gibraltar	Mission Tunnel	Devils Canyon	Ground Water	Desal	Total From Own Sources	From Imported Sources (CCWA/ SWP)	SWP Received for La Cumbre Mutual Conveyance	Total Water Received	Agricultural Deliveries	Net Exports to Goleta Water Dist.	Conveyance to La Cumbre Mutual	Export to Long Term Storage (GW Injection)	Gross Water Use
1996	5,561	5,452	1,692	71	-	-	12,776	-	-	**12,776**	103	44	-	75	**12,554**
1997	7,301	4,217	1,427	280	-	-	13,225	-	-	**13,225**	114	33	-	-	**13,078**
1998	7,269	3,962	1,803	79	73	-	13,186	-	1,012	**14,198**	81	648	1,012	-	**12,457**
1999	5,879	5,273	1,872	38	134	-	13,196	-	1,042	**14,238**	107	(294)	1,042	-	**13,383**
2000	11,300	1,394	1,149	-	357	-	14,200	-	646	**14,846**	120	179	646	109	**13,792**
2001	5,523	5,573	1,886	-	280	-	13,262	-	830	**14,092**	113	(276)	830	81	**13,344**
2002	7,373	3,827	1,267	3	8	-	12,478	539	945	**13,962**	114	(48)	945	72	**12,879**
2003	6,484	3,127	942	31	-	-	10,584	1,924	742	**13,250**	113	172	742	-	**12,223**
2004	7,777	3,414	1,256	20	-	-	12,467	890	776	**14,133**	134	62	776	88	**13,073**
2005	7,523	1,879	1,585	70	-	-	11,057	1,903	550	**13,510**	105	312	550	15	**12,528**
2006	5,305	4,546	1,786	-	906	-	12,543	659	511	**13,713**	134	208	511	-	**12,860**
2007	7,804	3,783	1,409	-	434	-	13,430	667	804	**14,901**	157	(227)	804	61	**14,106**
2008	10,734	1,576	1,093	160	751	-	14,314	609	879	**15,802**	155	212	879	124	**14,432**
2009	8,236	2,569	1,142	76	1,112	-	13,135	496	902	**14,533**	139	(225)	902	141	**13,576**
2010	7,637	2,933	1,220	-	1,164	-	12,954	541	947	**14,442**	106	38	947	75	**13,276**

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Table 6
Water Demands and Total Water Use (AF)

	Actual				*Projected*							
	2005		**2010**		**2015**		**2020**		**2025**		**2030**	
Water use sectors	**# of accts.**	**Volume (AF)**	**# of accts.**	**Volume (AF)**	**# of accts.**	**Volume (AF)**	**# of accts.**	**Volume (AF)**	**# of accts.**	**Volume (AF)**	**# of accts.**	**Volume (AF)**
Single family	16,850	5,758	16,920	5,824	17,007	5,684	17,094	5,588	17,181	5,527	17,268	5,487
Multi-family	5,786	3,094	6,126	2,931	6,417	2,860	6,417	2,812	6,417	2,781	6,417	2,761
Commercial	2,364	2,230	2,530	2,066	2,565	2,016	2,600	1,982	2,635	1,960	2,670	1,946
Industrial	53	360	56	255	56	249	56	245	56	242	56	240
Institutional/ Government (included w/ Comm.)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Landscape	624	556	729	541	749	528	769	519	789	513	809	510
Agriculture	56	105	59	106	59	103	59	102	59	101	59	100
Total Potable Accts. & Deliveries (Metered Sales)	25,733	12,104	26,420	11,722	26,854	11,441	26,996	11,248	27,138	11,125	27,280	11,045
Sales to Other Agencies		0		0		0		0		0		0
Net Exports to Other Districts		312		38		0		0		0		0
Groundwater Recharge		15		75		75		75		75		75
Blending to Recycled Water		645		651		300		275		275		275
System Losses		NA		1,009		995		978		967		960
Total Water Use		**13,076**		**13,495**		**12,811**		**12,576**		**12,443**		**12,355**

Note: "Total Water Use" above and as illustrated in Table 11 is not intended to equal "Gross Water Use" that is the basis of the Urban Water Use Target calculation.

Tabulation of Target & Projected Urban Water Use:

	2015		**2020**		**2025**		**2030**
Potable Metered Sales:	11,441		11,248		11,125		11,045
Potable System Losses:	995		978		967		960
Blending to Recycled Water System:	300		275		275		275
Less Agriculture Deliveries:	-103		-102		-101		-100
Gross Water Use:	12,632		12,399		12,267		12,180
Projected Service Area Population:	93,091		94,766		96,441		98,116
Target Urban Water Use (GPCD):	123		117		117		117
Projected Urban Water Use (GPCD):	121		117		114		111

	2005		**2010**		**2015**		**2020**		**2025**		**2030**	
Recycled Water Sales	**# of accts.**	**Volume (AF)**	**# of accts.**	**Volume (AF)**	**# of accts.**	**Volume (AF)**	**# of accts.**	**Volume (AF)**	**# of accts.**	**Volume (AF)**	**# of accts.**	**Volume (AF)**
	76	718	84	697	99	875	114	950	129	1,025	144	1,100

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Water Demands

Table 6 shows the various demands on the City water system at 5-year intervals. These include metered sales by customer class, net exports, groundwater recharge, blend water into the recycled water system for managing mineral content, and system losses. Also included is a tabulation of target and projected values for urban water use, consistent with methodologies for implementing SBx7-7 water use reduction requirements.

Table 7 summarizes water use projected to be needed to serve single-family residential and multi-family residential housing needed for lower income households. The information is derived from Appendix C, which was prepared by staff of the City's Community Development Department using information from the Plan Santa Barbara General Plan Certified Final EIR dated September 2010 and the City of Santa Barbara General Plan Housing Element, September 2010 Proposed Final. These demands have been included in the overall water use projections in Table 6.

Table 7
Low-Income Projected Water Demand (AFY)

	2010	2015	2020	2025	2030
Single Family Residential	552	560	568	576	584
Multi-Family Residential	192	213	235	256	278
Total	**744**	**774**	**803**	**832**	**862**

The City of Santa Barbara receives wholesale deliveries of State Water from the Central Coast Water Authority. Table 8 shows the projections of water use from CCWA, as they were provided to CCWA.

Table 8
Retail Agency Demand Projections Provided to Wholesale Supplier (AFY)

	2010	2015	2020	2025	2030
Central Coast Water Authority	2,084	2,064	2,043	2,023	2,002

Water Use Reduction Plan

The City's long term commitment to water conservation is evident in reductions in water demand achieved over the past twenty years. Total system demand has dropped from approximately 16,300 AFY in the late 1980's to approximately 14,000 AFY currently. To achieve the next level of demand management reductions it was important to evaluate the effects of updated plumbing codes and appliance standards, ongoing implementation of the CUWCC BMP's, and added measures that can be cost effectively implemented to further offset water demand.

The City hired Maddaus Water Management (MWM), an engineering firm widely recognized for expertise in demand management, to analyze the existing conservation program and use its proprietary Demand Management Decision Support System (DSS) to model current and potential water conservation measures. The DSS also quantified the demand reduction effects of these measures along with the effects of plumbing codes and appliance standards. Key findings, including the effect of assumed development consistent with the City's General Plan update process, are as follows:

- The 2030 system demand would be expected to increase by 1,202 AFY (compared to the 2006 model reference point of 13,623 AFY) to 14,825 AFY, if the effects of already adopted plumbing codes and appliance standards were not considered. (Note that this will not actually occur, but it is a useful reference point to illustrate the ongoing effect of stricter codes and standards on both new and existing development.)

- The effects of the plumbing code and appliance standards are estimated to reduce 2030 demand by 919 AFY, to 13,906 AFY, not including the effects of conservation program activities and measures.

- Conservation Program B, which includes current conservation program measures along with those that together meet a utility benefit-cost ratio of 1.0, is estimated to reduce demand by an additional 498 AFY, to 13,408 AFY.

The results described above are illustrated in Figure ES-1 of the Executive Summary of the Technical Memorandum prepared by MWM, which is included in this plan as Appendix D. The benefit-cost ratios shown in Table ES-3 of Appendix D were calculated on the basis of an avoided cost of $600 per AF, which is an average of the variable costs associated with State Water Project Table A deliveries, groundwater produced from the Ortega Groundwater Treatment Plant, and deliveries of purchased water through the State Water Project during non-critical drought periods. Program B was selected on the basis of its cost effectiveness. The model results have been incorporated into the demand and Urban Water Use projections itemized in Table 9 and graphed in Figure 7. The results of these projections indicate that the City will meet its 2020 Urban Water Use Target by implementing the water conservation measures in Program B, adding 150 AFY of new recycled water user demand to offset potable usage, and reducing the amount of potable blend water from a 2010 amount of 651 AFY to 250 AFY. The required new recycled demand is about half of what has already been identified in planning studies and much of the blend water reduction will come from planned corrections to the secondary treatment process. The conservation measures of Program B are identified in Table ES-1 of Appendix D.

Figure 7

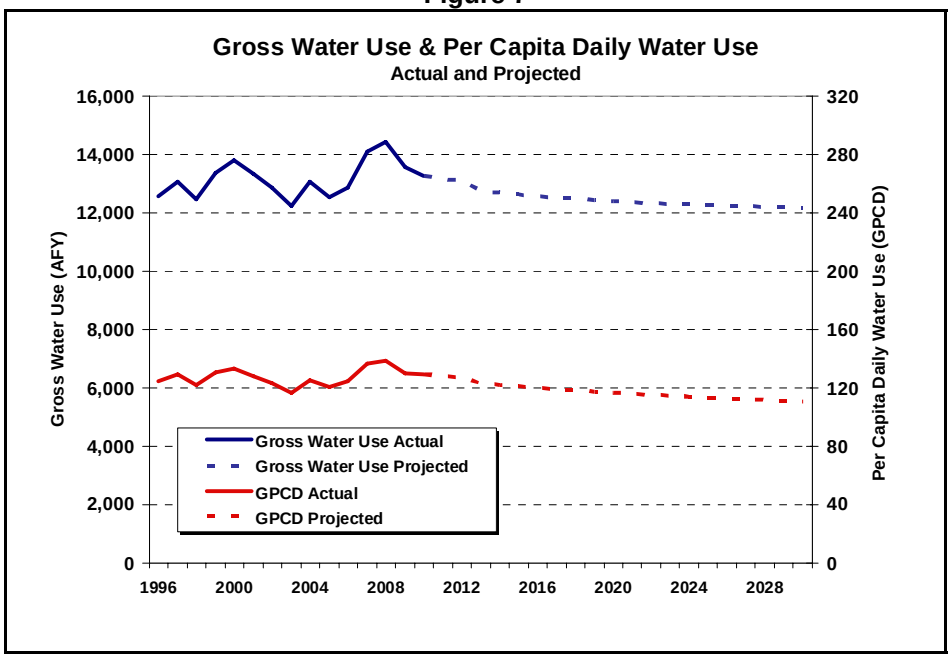

Table 9

Demand & Urban Water Use Projections

Volumes in AF, except as noted

Input assumptions:

300 = Planned Potable Demand Reduction from New Recycled Water Connections
Row 27 = Projected "Program B" demand reductions, including plumbing codes & conservation program
0 = Additional 20-year demand reductions from conservation above "Program B"
275 = Target Blending Amount After Secondary Improvement (starting 2015)

Summary Information:

300 = Total Demand Reductions from New Recycled Water
1320 = Total Demand Reductions from New Water Conservation
150 = Demand reductions from incr. recycled water by 2020
802 = Conservation reductions projected by 2020

Service Area Growth Projection - Per Plan SB Final EIR:

20-Year Breakout by Sector:	20-year Total	Annual Amount
Single Family Residential	166	8.31
Multi-Family Residential	445	22.26
Non-Residential	283	14.16
Total:	**895**	**44.73**

0 = Calculated average annual required conservation demand reductions in excess of "Program B"

6,700 = 20-year Population Growth Projection (from Plan SB Final EIR)
335 = Annual average population increase

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Starting Potable Production		12,731	12,669	12,614	12,557	12,497	12,436	12,397	12,352	12,314	12,270	12,226	12,195	12,166	12,140	12,115	12,093	12,072	12,053	12,036	12,020
Demand from New Devel.																					
SFR		8.31	8.31	8.31	8.31	8.31	8.31	8.31	8.31	8.31	8.31	8.31	8.31	8.31	8.31	8.31	8.31	8.31	8.31	8.31	8.31
MFR		22.26	22.26	22.26	22.26	22.26	22.26	22.26	22.26	22.26	22.26	22.26	22.26	22.26	22.26	22.26	22.26	22.26	22.26	22.26	22.26
Non-Resid.		14.16	14.16	14.16	14.16	14.16	14.16	14.16	14.16	14.16	14.16	14.16	14.16	14.16	14.16	14.16	14.16	14.16	14.16	14.16	14.16
Demand Reductions																					
New Recyceld Water Use		-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15
New Conserv. - Prog B		-92	-84	-87	-90	-91	-69	-74	-68	-73	-74	-61	-59	-56	-54	-52	-50	-49	-47	-46	-44
New Conserv. > Prog B		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ending Potable Production	12,731	12,669	12,614	12,557	12,497	12,436	12,397	12,352	12,314	12,270	12,226	12,195	12,166	12,140	12,115	12,093	12,072	12,053	12,036	12,020	12,005
Plus Blend Water to Recycled	651	600	600	300	300	300	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275
Less Agriculture Deliveries	-106	-105	-105	-104	-104	-103	-103	-103	-102	-102	-102	-101	-101	-101	-101	-101	-100	-100	-100	-100	-100
Gross Water Use:	**13,276**	**13,164**	**13,109**	**12,752**	**12,693**	**12,632**	**12,568**	**12,524**	**12,486**	**12,443**	**12,399**	**12,369**	**12,340**	**12,314**	**12,289**	**12,267**	**12,246**	**12,228**	**12,210**	**12,195**	**12,180**
Service Area Population:																					
Starting Amount		91,416	91,751	92,086	92,421	92,756	93,091	93,426	93,761	94,096	94,431	94,766	95,101	95,436	95,771	96,106	96,441	96,776	97,111	97,446	97,781
Added Population		335	335	335	335	335	335	335	335	335	335	335	335	335	335	335	335	335	335	335	335
Ending Amount	91,416	91,751	92,086	92,421	92,756	93,091	93,426	93,761	94,096	94,431	94,766	95,101	95,436	95,771	96,106	96,441	96,776	97,111	97,446	97,781	98,116
Per Capita Use (GPCD):	**130**	**128**	**127**	**123**	**122**	**121**	**120**	**119**	**118**	**118**	**117**	**116**	**115**	**115**	**114**	**114**	**113**	**112**	**112**	**111**	**111**
Recycled Production:	696	815	830	845	860	875	890	905	920	935	950	965	980	995	1,010	1,025	1,040	1,055	1,070	1,085	1,100
System Production:	**13,427**	**13,484**	**13,444**	**13,402**	**13,357**	**13,311**	**13,287**	**13,257**	**13,234**	**13,205**	**13,176**	**13,160**	**13,146**	**13,135**	**13,125**	**13,118**	**13,112**	**13,108**	**13,106**	**13,105**	**13,105**

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Section 4: System Supplies

Water Sources

The City operates a diverse water supply. The various sources of supply are described below. The following descriptions are intended as a brief summary and shall not be construed as exhaustive or as a waiver of any right or interest in water.

Cachuma Project

Description: Earth filled dam (Bradbury Dam) located on the Santa Ynez River 25 miles northwest of Santa Barbara; owned and operated by U.S. Bureau of Reclamation; constructed early 1950's; interim seismic retrofit completed 1996, permanent repairs were deemed substantially complete in 2001; water is delivered through the Santa Ynez Mountains to the South Coast via 6.4 mile Tecolote Tunnel, 24.3 mile South Coast Conduit, and four regulating reservoirs, completed in 1956;

Drainage Area: 417 square miles (including Gibraltar drainage area)

Current Capacity: 186,636 AF (approximately 195,600 AF with modifications to allow a 3' surcharge for fish releases)

Max. Normal Pool: El. 750 (El. 753 with modifications to allow fish account surcharge)

Annual Yield: The current total project operational yield equals 25,714 AFY. The City's share is 32.19% or 8,277 AFY.

Operating Criteria: The project operates under a permit granted by the State Water Resources Control Board (SWRCB). The current Water Right Order 94-5 continued earlier requirements for releases to protect downstream interests (e.g. the City of Lompoc, Improvement District No. 1 of the Santa Ynez River Water Conservation District and riparian groundwater pumpers along the Santa Ynez River) and required hearings in 2002 and 2003 to address outstanding issues related to potential project impacts on vegetation, fish, and downstream users. The hearings have been completed and a decision by the SWRCB has long been pending completion of environmental documentation.

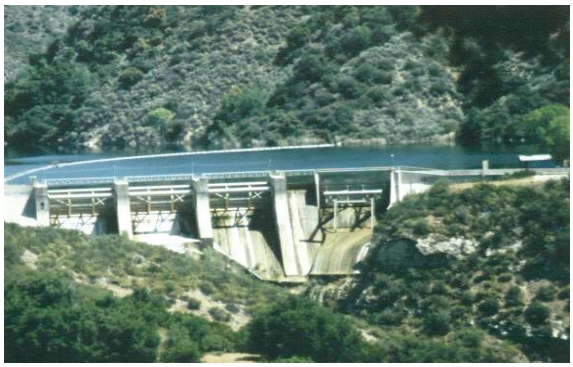
Project water is accumulated to the extent that inflow is not needed to satisfy the release requirements. It is delivered to the member units in accordance with a Master Contract between U.S. Bureau of Reclamation, and the Santa Barbara County Water Agency and the Cachuma Project member units. The contract was renewed in 1996 for a twenty five-year term. Siltation rate at Cachuma has been projected to be approximately 5% of current volume between now and 2030. Water quality has traditionally been good enough to require only conventional filtration. Impacts from a recent major fire in the watershed and tighter regulations on disinfectant byproducts have led to the planned advance treatment/ozone project at Cater Treatment plant.

A key policy of the City's 2011 LTWSP is that drought planning should be based on a six-year critical drought period rather than the historical five-year period. Since the current project yield of 25,714 AFY is based on the five-year historical drought, the City's operations will be based on deferring use of some current normal year entitlement in order to build carryover for use in the sixth year of a drought.

Cost Information: The water supply contract with the U.S. Bureau of Reclamation sets the unit cost of the City's share of project yield at about $120/AF, or approximately $1,000,000 annually. Since this is treated as a payback of capital cost, it is not considered a variable cost. Additional annual fixed costs include about $1,500,000 for the City's share of the Cachuma Operation and Maintenance Board (COMB) budget for administration, operation, maintenance, and capital improvement of the project, and about $200,000 for the City's share of Cachuma Conservation Release Board (CCRB) expenses associated with managing the members' water rights at Cachuma and implementing the Lower Santa Ynez River Fish Management Plan. Variable costs consist of the marginal cost of treatment at Cater Treatment Plant, which is currently approximately $100/AF. Seismic reinforcement of the dam and rehabilitation of the dam's gates have been completed. Upcoming capital costs focus on upgrade and rehabilitation of the South Coast Conduit portion of the project.

Gibraltar Reservoir

Description: Constant radius, concrete arch dam located on the Santa Ynez River, 8 miles north of Santa Barbara; owned by City of Santa Barbara; constructed 1913-20, with an original capacity of 15,783 AF; raised to current elevation in 1949; strengthened in 1990-91;



water delivered through the Santa Ynez Mountains to Santa Barbara via Mission Tunnel

Current Capacity: 5,251 Acre Feet (per 2010 Bathymetric Study)

Drainage Area: 216 square miles

Max. Normal Pool: El. 1,400

Annual Yield: Yield will be dictated by management as described under "Operating Criteria" below. (See discussion of Operating Criteria below.)

Operating Criteria: Current Gibraltar Reservoir operations are based on the 1989 Upper Santa Ynez River Operations Agreement (Pass Through Agreement) by which the City agreed to defer a second enlargement of the reservoir in exchange for the right to receive a portion of its Gibraltar water through Lake Cachuma. The intent of this arrangement was to allow the City and other parties to continue to experience Santa Ynez River supplies that would reflect the Gibraltar storage volume as it was in 1988.

The City is working to obtain a Warren Act agreement necessary for the Pass Through mode of the agreement. Pass Through mode involves tracking the yield of a hypothetical "Base Reservoir" that is equal to the 1988 storage capacity of 8,567 AF, and operated under the procedures defined in the Pass Through Agreement. The Pass Through mode allows Gibraltar Reservoir diversions (including diversions to Mission Tunnel and the portion taken through Cachuma) up to the amount that could have been diverted under the "Base Reservoir" operations. Modeling done in 1989 indicated that long-term average yield of the Base Reservoir would be 5,160 AFY. Yield under the actual Pass Through operations can be expected to be somewhat less on average, due to potential losses associated with conveyance of water between Gibraltar and Cachuma, and spill and evaporation of Pass Through water at Cachuma. For conservative estimates of Gibraltar yield, it is assumed that deliveries will average 70% of the amounts estimated in the environmental analysis on the Cachuma Water rights hearings before the SWRCB. In normal years, this results in an estimated yield of 3,206 AFY.

Water quality is affected by turbidity during high flow periods, which temporarily interrupts diversions. In addition, residual water quality impacts from the 2007 Zaca Fire continue to affect the level of dissolved organic material in Gibraltar water, resulting in significantly increased treatment costs using interim procedures pending completion of an advanced treatment/ozone project at the City's Cater Treatment Plant.

Cost Information: Costs for this source of supply are primarily "sunk" costs, including the original cost of construction, plus a cost of $9 million for strengthening in 1990-91, plus the cost of Mission Tunnel. Variable costs for Gibraltar are the same as for Cachuma water, which is approximately $100/AF.

Devil's Canyon Creek

Description: The City maintains a small diversion works on Devil's Canyon Creek below Gibraltar Dam which diverts water from Devil's Canyon Creek into Mission Tunnel.

Annual Yield: Average: 118 AFY
Range: 0 AFY - 557 AFY

Operating Criteria: Water is diverted as available to help improve the quality of water going into Mission Tunnel. Diverted water is counted as a part of allowable diversions under the Pass Through Agreement.

Cost Information: Variable costs are the same as Gibraltar water or approximately $100/AF.

Mission Tunnel

Description: A 3.7 mile tunnel through the Santa Ynez Mountains running from the North Portal, located approximately 1,700 feet downstream of Gibraltar Dam to the South Portal, located on Mission Creek approximately 3 miles north of downtown Santa Barbara; constructed 1904-1910; rehabilitation work completed December 1994.

Annual Infiltration: For the period of 1976 through 2005, infiltration ranged from 500 AFY to 2,375 AFY, with an average of 1,125 AFY.

Operating Criteria: Tunnel infiltration augments water conveyed from Gibraltar Reservoir, normally flowing to Cater Treatment Plant via the penstock, hydroelectric facility, and Lauro Reservoir; a portion of this combined flow is sometimes diverted to Mission Creek for groundwater recharge purposes. Water quality is relatively hard, as is typical of the region, but otherwise good.

Cost Information: Variable costs are the same as Cachuma and Gibraltar water or approximately $100/AF.

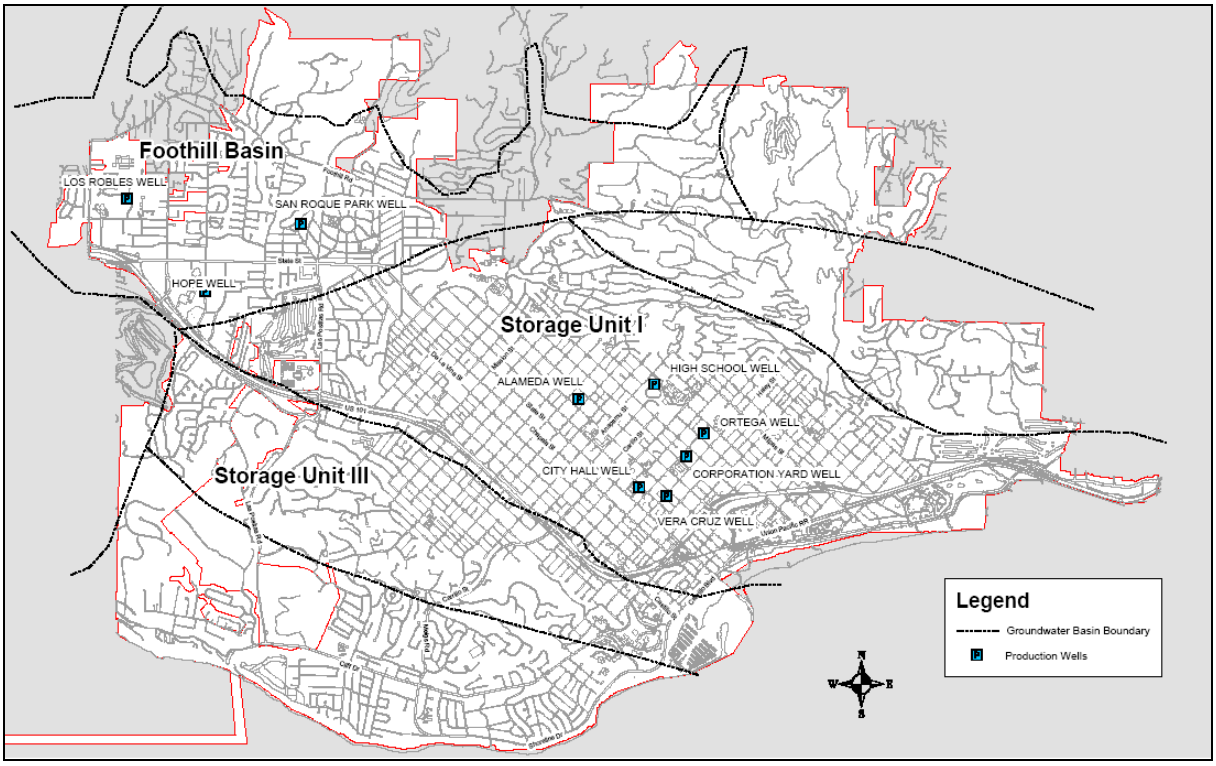
Groundwater

Description: In addition to groundwater obtained from infiltration to Mission Tunnel, the City obtains pumped groundwater primarily from two hydrogeologic units: Storage Unit No. 1 (in the downtown area) and the Foothill Basin (in the outer State Street area) as shown in Figure 8. The estimated long-term safe yield of these two basins is approximately 1,800 AFY. Extraction by private pumpers is estimated at 500 AFY, leaving a safe yield of about 1,300 AFY available to the City. Pumping historically averages less than this safe yield amount, except for rare critical drought periods as described below. State Bulletin 118 does not list City basins as being in overdraft, which is consistent with City experience.

The City has six production wells in Storage Unit No. 1 and three in the Foothill Basin, though the wells are in need of varying degrees of maintenance or replacement. Well depths range from about 315 feet to 670 feet. While the estimated total pumping capacity is approximately 4,500 AFY, a capacity of 4,150 AFY is assumed for planning purposes. The total usable storage capacity of these two basins is estimated at 16,000 AF of City pumping.

A third basin (Storage Unit No. 3 in the Las Positas Valley area) provides additional safe yield of approximately 100 AFY, but water quality is inferior and is not planned for use.

Figure 8
Groundwater Basins and Well Locations



Seawater intrusion into Storage Unit No. 1 is a key issue because the groundwater basin is in contact with seawater that can flow into the basin during periods of heavy pumping. Under normal periods of little or no pumping, the groundwater flow is toward the ocean, which stops intrusion and pushes the seawater interface seaward. The City's Multiple Objective Optimization Model (developed by USGS) was used to estimate pumping levels during a critical drought period that represent a compromise between maximizing production and minimizing seawater intrusion. The model results in total pumping of up to about 17,800 AF during the drought period, allowing some intrusion for the last portion of the drought. This modeling was based on one additional well in each basin, which may have implications for future capital program needs. In Storage Unit No. 1, the assumption was that new wells would be placed further inland to minimize intrusion. Update and enhancement of this model by USGS is underway.

Perennial Yield: The portion of the perennial yield available to the City from Storage Unit No. 1 and the Foothill Basin is approximately 1,300 AFY.

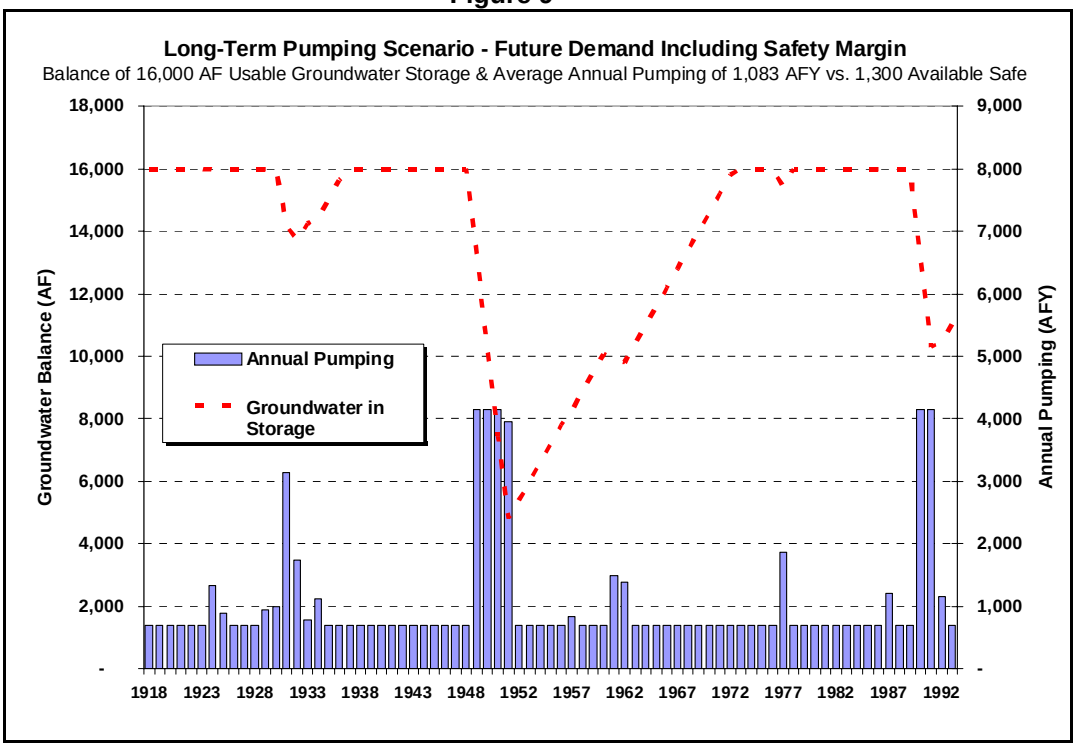
Operating Criteria: Under a conjunctive management program, the City pumps more groundwater to replace surface supplies lost during drought and less during periods of ample surface supplies, when basins are allowed to recharge. Natural recharge is augmented through releases to Mission Creek and injection at two production wells. A primary goal is to attempt to utilize the perennial yield of the groundwater basins, while maximizing available storage for back-up during drought. Recent pumping by basin is shown in Table 10, and is based on volumetric meter data.

Table 10
Groundwater Pumped by Fiscal Year (AF)

	2006	2007	2008	2009	2010
Storage Unit No. 1	326	108	203	398	475
Foothill Basin	580	326	548	714	689
Total:	906	434	751	1,112	1,164

Figure 9 illustrates a long-term pumping scenario based on the conservative supply and demand scenario discussed in Section 5. Average pumping is 1,083 AFY compared to an available safe yield of 1,300 AFY.

Figure 9



Water quality constraints (primarily due to high levels of sulfide, iron, and manganese) are being addressed through an upgrade of the Ortega Groundwater Treatment Plant in Storage Unit No. 1. Seawater intrusion has been addressed in part by adding wells further inland, at Alameda Park and Santa Barbara High School and by more sophisticated modeling

as a part of the current USGS work. The production capacity of 4,150 AFY is the target for meeting long-term supply requirements, but is only used on a limited basis to avoid exceeding the long term perennial yield or causing excessive seawater intrusion. Water quality in the Foothill Basin is better and typically only wellhead disinfection is required.

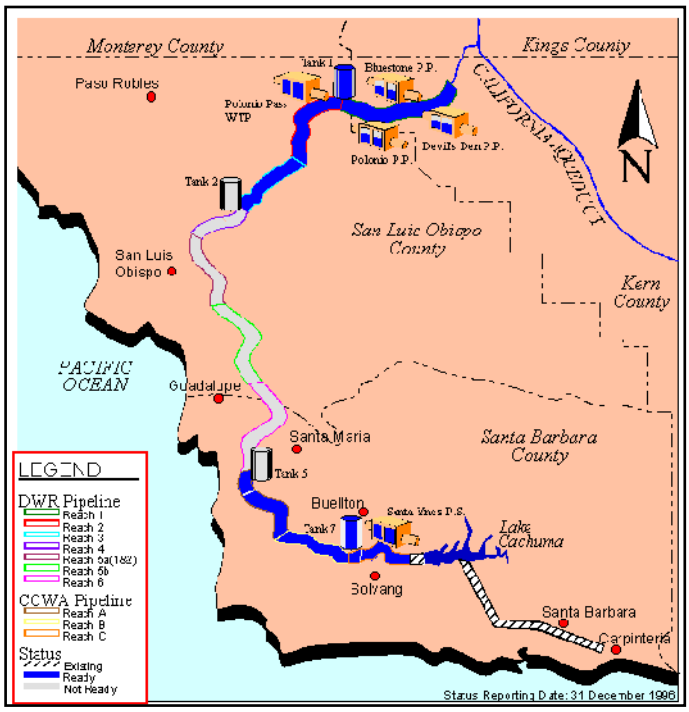
The City has managed groundwater under longstanding Pueblo Water Rights and there is no adjudication or formal groundwater management plan. However, policy direction in the recently updated LTWSP includes development of a groundwater management plan in conformance with State requirements. The City has volunteered to monitor and report groundwater levels under the California Statewide Groundwater Elevation Monitoring (CASGEM) program.

Cost Information: Variable costs for groundwater production range from $120/AF to $610/AF.

State Water Project

Description: The City, through CCWA, is a participant in the State Water Project and is eligible to receive State Project water via the 102 mile Coastal Branch of the State Aqueduct and the 42-mile Santa Ynez Extension ending at Lake Cachuma. Construction was completed in 1997. When ordered by project participants, water is delivered from Cachuma through Tecolote Tunnel along with Cachuma Project water. The City first took delivery of State Water in 2002.

Annual Yield: The City's "Table A" amount is 3,300 AFY, including a 10% drought buffer. This amount is projected to remain the same throughout the planning period of 2010 to 2030. Deliveries are subject to availability. Average long-term deliveries are estimated at 1,980 AFY in the most recent DWR State Water Project Delivery Reliability Report. Further discussion of reliability occurs later in this plan.



Operating Criteria: State Project water orders have ranged from a minimum of about 600 AF during normal supply conditions, up to the full 3,300 AF Table A amount

when dry weather reduced Cachuma storage below 100,000 AF. While there is uncertainty about future State Water Project reliability, the 2009 State Water Project Delivery Reliability Report is the best estimate of expected deliveries, and has been used by CCWA to project future deliveries through the planning period for a range of hydrologic conditions, as shown in Table 11. The City has confirmed with CCWA its intent to use these estimates for future planning, except as such projections may be modified for sensitivity analysis of future water supply reliability. Available deliveries are expected to be used as appropriate given current conditions, including delivery as needed to meet current demands, carryover, sale to other agencies, and/or banking for improved future supply reliability.

Table 11
Maximum Table A Amount in Selected Drought Conditions (AF)

Drought Condition	2010	2015	2020	2025	2030	2035
Long Term Average	2,084	2,064	2,043	2,023	2,002	1,982
Single Dry Year 1977	184	217	250	282	315	348
2-year drought 1991-1992	872	870	867	865	863	861
2-year drought 1990-1991	1,161	1,067	974	880	786	692
4-year drought 1929-1932	1,112	1,128	1,144	1,160	1,177	1,193
4-year drought 1989-1992	1,181	1,156	1,131	1,106	1,081	1,056
6-year drought 1929-1934	1,118	1,132	1,145	1,159	1,173	1,186
6-year drought 1987-1992	1,247	1,192	1,137	1,082	1,028	973

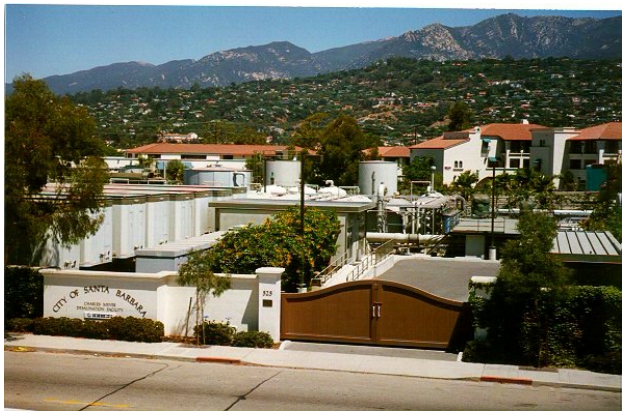
Besides delivering project water, the pipeline can be utilized to take advantage of available non-project water on a year-to-year basis to firm up deliveries during drought.

Cost Information: The variable costs for State Water are approximately $200/AF for water provided by exchange with SYRWCD-ID#1 and $300 for State Water delivered into Lake Cachuma, plus the treatment cost of $100/AF at Cater Treatment Plant. The total project capital costs include costs for the State portion and the local (CCWA) portion of the project. The State portion capital cost is approximately $461 million. The City's share is 7%, or approximately $32.3 million. The local portion has a capital cost of approximately $119 million, with a City share of 13%, or approximately $16 million. The unit cost, including amortized capital costs and variable costs, is approximately $1,600/AF.

Desalination

Description: The City constructed a reverse osmosis seawater desalination facility as an emergency water supply during the drought of 1987-1992. The facility has since been incorporated into the City's long-term supply plan as a way of reducing shortages due to depleted surface supplies during drought. Two neighboring water purveyors participated in the temporary project, but have since dropped out of the project. A portion of the reverse osmosis

filtration capacity was subsequently sold, leaving current capacity of 3,125 AFY. This capacity is entirely dedicated to City use, though it is currently in a long-term storage mode to reduce maintenance costs and would require approximately one year to recommission. This time frame is consistent with the anticipated use of the facility during drought, a water shortage condition that develops rather slowly.



Annual Capacity: With the departure of the co-participants and sale of a portion of the capacity, the desalination facility now has a production capacity of up to 3,125 AFY, subject to time and costs to recommission as noted below.

Operating Criteria: Relatively high variable costs for desalination make this supply the last to be used during periods of shortage. Recently updated water supply policies identify a key goal of deferring reactivation until at least the sixth year of a critical drought period.

Cost Information: A 2009 study by Carollo Engineers estimated variable costs at $1,470/AF and a capital cost of $17.7 million for reactivation. The original capital cost for construction of the facility was $34 million. Approximately $3 million is set aside as a reserve for this purpose. The balance would be budgeted as a part of the Water Fund Capital Program.

Recycled Water

Description: The City initiated planning for a water reclamation project in the early 1980's. Phase I was completed in 1989. It included addition of tertiary treatment with carbon filtration and disinfection at El Estero Wastewater Treatment Plant, a 600,000 gallon distribution reservoir and pumping station, and 5.1 miles of distribution main. Phase II was completed in 1992, adding an additional pumping station, a 1.5 million gallon reservoir, and 8.3 miles of distribution main. The system now provides recycled water to 80 accounts that serve 440 acres of landscaped area at parks, schools, golf courses, and other large landscaped areas. Several public restrooms have been retrofitted to use recycled water for toilet flushing. Water is provided at 80% of the potable water irrigation rate as an incentive for using recycled water and to compensate for additional irrigation requirements associated with salt leaching. Monitoring of salt levels in the soil was conducted twice per year from 1993 through 2003. No long-term build-up of soil salt was indicated.

Annual Capacity: The system has the capacity to treat and deliver 1,400 AFY; current demand is approximately 800 AFY, plus approximately 300 AFY of process water for use at EEWTP.

Future Uses: Optimization of the use of recycled water has been mostly accomplished with the completion of Phase II. Distribution pipelines have been constructed to all cost effective use areas, and most existing potential user sites are now connected. Use of recycled water for toilet flushing has been implemented in selected public restrooms and others are being added. New development in proximity to the recycled water main is required to utilize recycled water for landscape irrigation. Conversion or remaining potable use at current user sites, addition of new users along the existing distribution, and some limited expansion of the distribution system are expected to allow an additional 300 AFY of new usage. Recycled water users enjoy a rate that is 20% below potable irrigation for recreational sites and 60% below rates for commercial customers.

Operating Criteria: Recycled water is a non-variable supply in that it can only be supplied to those customers that are connected to the recycled water system. Usage is relatively constant regardless of drought conditions. Some potable water is blended with recycled water as a means of maintaining acceptable recycled water quality.

Cost Information: Variable costs, including pumping and treatment, range from $157/AF for the Phase 1 zone to $247/AF for the Phase 2 zone. The capital cost for the construction of Phases I and II was approximately $15.2 million. The annualized unit cost, including amortized capital costs and variable costs, is approximately $1,450/AF.

Projected Water Supplies

Table 12 itemizes projected water supplies at five-year increments from 2010 to 2030. Some deliveries are projected to be reserved to build banked storage and carryover in preparation for a critical drought period. A safety margin of 10% is maintained, consistent with City water supply policies, in case of unanticipated added demand, such as annexations, or supply shortages.

Transfer Opportunities

The City's primary water supply challenge is enduring the occasional prolonged droughts that have reoccurred roughly every 40 years, and are projected to occur more frequently as a result of climate change. At other times, the combination of multi-year storage capacity at Lake Cachuma and groundwater supplies to supplement reduced deliveries from Gibraltar Reservoir provides ample water supplies. Accordingly, the most attractive exchange or transfer opportunity will be the use of water banking to build a reserve for use during the critical drought period. State Water supplies in excess of year-to-year needs are projected to be available in amounts averaging 376 AFY in the long-term scenario of future conditions described in Section 5. Approximately 4,400 AF is available in the six years preceding the local critical drought period of 1947 to 1951. This projected availability is the basis of updated water supply policy to investigate banking opportunities as the primary means of deferring use of desalination until at least the sixth year of a drought.

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Table 12

Water Supplies - Current and Projected (AF)

	Actual	Projected			
Potable Water Supplies	**2010**	**2015**	**2020**	**2025**	**2030**
Wholesaler: CCWA/State Water	2,084	2,064	2,043	2,023	2,002
Less State Water Deliveries to Carryover/Banked Storage	0	-150	-250	-300	-200
Cachuma Project	8,277	8,172	8,070	7,967	7,863
Less Project Water to Local Carryover Storage	-640	-1,300	-1,283	-1,313	-1,297
Gibraltar Reservoir/Devils Canyon	2,933	3,206	3,206	3,206	3,206
Mission Tunnel	1,220	1,125	1,125	1,125	1,125
Groundwater	1,164	1,083	1,083	1,083	1,083
Desalination	0	0	0	0	0
Total Potable Supplies:	**15,038**	**14,200**	**13,994**	**13,791**	**13,782**
Less Blend Water:	-651	-300	-275	-275	-275
Less Net Exports to GWD:	-38	0	0	0	0
Less Export to Groundwater Storage:	-75	-150	-150	-150	-150
Potable Supplies Available for Retail Demand:	**14,274**	**13,750**	**13,569**	**13,366**	**13,357**
Less Projected Retail Demand:	-12,731	-12,436	-12,226	-12,093	-12,005
Available for Safety Margin:	**1,543**	**1,314**	**1,343**	**1,273**	**1,352**
% Available for Safety Margin (10% goal per City policy):	**11%**	**10%**	**10%**	**10%**	**10%**

Notes:

1) Above projections assume years of normal supply availability
2) Adequate water supply during critical drought depends on carryover/banking of SWP and/or Cachuma water during normal years
3) Projections reflect minor projected increases in demand, which are offset by demand reduction from new conservation & recycled water
4) State Water delivery projections per CCWA
5) Cachuma Project yield reflects 5% reduction over 20-year planning period due to sedimentation
6) Gibraltar yield based on 70% of estimates used in Draft EIR for Cachuma water rights hearing (Mitigation Mode - normal years)
7) Mission Tunnel yield based on Draft EIR for Cachuma water rights hearing
8) Groundwater: average pumping amounts for 2030 conditions under LTWSP performance analysis at 14,000 + 10% safety margin

	Actual	Projected			
Recycled Water Supplies	**2010**	**2015**	**2020**	**2025**	**2030**
Recycled Water from Tertiary Filters (net of process water)	45	575	675	750	825
Blend Water	651	300	275	275	275
Total Production for Recycled Retail Demand:	**696**	**875**	**950**	**1,025**	**1,100**

Notes:

1) 2010 reflects current secondary process issues; assumed to be resolved by 2015, allowing reduction in blend amounts
2) Reflects connection of 300 AFY of new recycled water demand by 2030

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Future Water Supply Projects

As mentioned above, investigation of options for banking unused supplies of State Water is expected be the primary option for deferring reactivation of the desalination facility. Other planned water supply projects include:

- Demand Reduction/Water Conservation Program: As described herein, the City will continue to implement a cost effective water conservation program in compliance with the CUWCC BMP's and equivalent to Program B as identified in the Water Conservation Technical Evaluation prepared by Maddaus Water Management.

- Sedimentation Management: An updated assessment of the City's Gibraltar Reservoir is planned to determine if there are cost effective options for halting loss of storage capacity. Additionally, the City will promote the development of a long term strategy to minimize loss of storage at Lake Cachuma, in conjunction with Cachuma Project Member Units and other appropriate parties, including State and Federal agencies.

- Pass Through Operations for Gibraltar Reservoir: As noted above, the existing Upper Santa Ynez River Operations agreement provides for storing Gibraltar water in Lake Cachuma to replace storage capacity lost to sedimentation. The City is working with the other parties to the agreement to develop information for environmental analysis of a Warren Act contract between the City and the U. S. Bureau of Reclamation.

- Ortega Groundwater Treatment Plant Rehabilitation: As described under the Groundwater section, water quality in Storage Unit No. 1 requires that pumped water be treated to remove sulfides, iron, and manganese prior to introduction into the distribution system. Final design has been completed and the project is expected to be bid in late 2011 or early 2012.

- Optimized Groundwater Management: Updated groundwater modeling by USGS will be used to assess strategies for groundwater management, including optimal use of available recharge, injection of potable water for artificial recharge, injection of recycled water as a barrier to seawater intrusion. Sites for new or replacement production wells will be evaluated with the goal of minimizing seawater intrusion. The City will develop a Groundwater Management Plan, consistent with State law, to provide for the orderly and responsible use of the City's groundwater resources.

- Expanded Recycled Water Use: Remaining system capacity of 300 AFY will be used to connect new users, primarily along the existing distribution system constructed during Phase 1 and Phase 2 of the project, with possible extensions where cost effective. Improvements to the secondary treatment process are planned, which will have the added benefit of reducing blend water requirements for recycled water. Options for further reducing blending will be investigated.

Implementation Schedule

Table 13 identifies implementation time frame for items related to the UWMP and provides notes on implementation of plan elements since adoption of the 2005 UWMP.

Table 13
Implementation Schedule

Description of Item	Implementation Schedule	Notes on Implementation Since 2005 UWMP Adoption
Water Conservation Program	Ongoing pursuant to MOU Regarding Urban Water Conservation, Long Term Water Supply Plan, and Water Conservation Act of 2009 Implement "Program B" water conservation measures	The program has been ongoing since adoption of the 2005 UWMP update. Results suggest demand reduction in excess of the program goal of 1,500 AFY.
Sedimentation management at surface reservoirs	Conduct sedimentation management alternatives assessment at Gibraltar Reservoir during FY 2012 Promote a joint effort to develop a long term strategy for sedimentation management at Lake Cachuma	Regular bathymetric surveys are conducted to monitor change in reservoir capacities
"Pass Through" operations for storage and conveyance of Gibraltar water at Lake Cachuma	Warren Act contract expected to be executed in FY 12, allowing "pass through" accounting to commence	Pass Through Agreement continues to guide operation of Gibraltar Reservoir; decision to implement Pass Through mode was motivated by substantial siltation from 2007 Zaca Fire.
Ortega Groundwater Treatment Plant Rehabilitation	Completion expected in FY 14	Comprehensive feasibility, design, and pilot testing completed.
Optimized groundwater management	Initiate development of a Groundwater Management Plan during FY 12 Identify production wells in need of replacement or relocation; FY 12 & 13	Multiple Objective Optimization Model (MOOM) by USGS is available for use in testing water supply scenarios, seawater intrusion impacts, and optimal well placement. Initiated a 3-year project with USGS to update MOOM and add 3-dimensional water quality component for more accurate assessment of seawater intrusion. Second of two new wells constructed completed.
Expanded recycled water use	Ongoing requirements for use of recycled water where available. Inventory of potential added uses being verified. Add 75 AFY of new recycled water demand by 2015 as a part of compliance with Water Conservation Act of 2009.	Plant inventory has been created and is made available to recycled water users. Development applications subject to the City's recycled water use requirement, as applicable. Recycled water demonstration garden established at El Estero Wastewater Treatment Plant

Description of Item	Implementation Schedule	Notes on Implementation Since 2005 UWMP Adoption
Enhancement of yield from State Water Project facilities	Investigate options for banking unused State Water when available, for use in mitigating effects of critical drought period and deferring reactivation of the desalination facility. Investigation planned for FY 2012.	Held initial discussions on water banking with relevant contacts.
Desalination Facility	Maintain as permanent part of City water supply in long term storage mode to minimize maintenance costs; ongoing.	Long-term storage mode has continued
Demand/Revenue Tracking	Ongoing, with monthly water production reports and semi-annual revenue reports to Water Commission and City Council	Demand and revenue tracking are an integral part of the budget adoption process and have continued.
Conduct an emergency water supply analysis to update current emergency procedures and evaluate the accuracy and scope of expected scenarios.	Anticipated during FY 12 & FY13	Improvements have been made to SCADA systems, distribution system, and back-up power supplies.

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Section 5: Water Supply Reliability and Water Shortage Contingency Plan

Water Supply Reliability and Drought Planning

During the recent update of the LTWSP, the City paid particular attention to the effects of water shortage caused by drought. This is appropriate based on a long history of drought in this region. Two key issues related to drought were analyzed:

1. Planned Duration of Critical Drought Period ("Multiple Dry Year Period")

   The critical drought period for the City's water supply occurs when there are multiple consecutive years of below average rainfall. This is due to the particular hydrology of the Santa Ynez River, where little or no inflow to Lake Cachuma typically occurs until at least average rainfall has occurred. When this condition of average or less rainfall continues for multiple years in succession, the storage level of Lake Cachuma drops and shortages in deliveries occur. Based on historical data, the critical drought period has had a duration of five years, with the worst local drought being the drought of 1947-1951.

   Climate change has the potential to impact the water supply, though it is still unclear whether this will have a significant effect during the planning period. To the extent information is available for the local area, overall rainfall amounts would be expected to be similar to recent history, but an increasing frequency of extreme rainfall events can be expected. This has the potential to result in an extended irrigation season with some associated increase in demand. From a water supply perspective, more concentrated rainfall events may have the benefit of increased inflow to Lake Cachuma. Guidance from the state planning agencies is that California can expect a 20% increase in both the frequency and the duration of dry periods. For the City's water supply this would suggest a critical drought period frequency of perhaps once every 30 years, instead of 40 years, and a duration of 6 years, instead of 5 years. Even though climate change impact information is incomplete and still undergoing critical review, the six-year drought period is a reasonable test and staff has used it for critical drought period analysis of the water supply, as discussed below under "Water Supply Performance."

2. Role of Desalination

   The City's desalination facility is a vital resource as a back-up for potential prolonged drought and unforeseen interruptions of the water supply and would help mitigate the economic impact of such situations. It is also a reliable source of water, once in operation. However, as noted above, reactivation of the facility will result in significant costs, if only for the planning and design work that would be needed to start the process. In recent years, a dry period of only three years has been enough to trigger the start of planning to reactivate the facility in case of continuing dry weather. In 2004, after three years of drought, the storage level at Lake Cachuma had been reduced to about 70,000 AF out of 190,000 AF (37% of capacity) and the City was beginning this process of planning for reactivation.

As a result of discussion of this issue between staff and the Water Commission, the water supply has been modeled to stretch available Cachuma supplies over a potential 6-year drought period, with the goal of deferring the reactivation process, i.e. to plan for operation in the sixth year of a critical drought period instead of the fifth year. This would reduce the frequency of the planning and design effort, as well as reducing the likelihood that the substantial expense of actually reactivating the desalination facility would be needed. This is another basis for the six-year critical drought period used in performance modeling.

Water Supply Performance – Multiple Dry Year Periods

The three charts included in Appendix E are based on a worksheet model developed to provide a long-term simulation of the City's water supply as a part of the LTWSP update. The City considers this sort of long term analysis to be the best way to illustrate water supply vulnerability during multiple year dry periods of various durations.

The worksheet uses a water supply target of 14,000 AFY of potable and recycled water production, plus 10% safety margin as applicable based on the various scenarios. The target is based on:

- The combined effects of new development during the planning period;
- Reductions in water use due to updated plumbing codes and appliance standards, the effects of the City's water conservation program; and
- The statutory requirement to meet a reduction in per capita daily water use by 2020.

The 14,000 AFY value also represents the rounded 5-year average demand for 2006 through 2010. Note that this is conservative compared to actual projected urban water use under the Water Conservation Act of 2009. Given uncertainties in water supply in California, it is appropriate to be conservative when viewing water management from the supply perspective.

Local supplies are estimated using results from the Santa Ynez River Hydrology Model developed by the Santa Barbara County Water Agency. State Water delivery estimates are based on the "Future Conditions" assumptions in DWR's 2009 State Water Project Delivery Reliability Report (as used for CCWA delivery projections for 2030), but modified to assume a delivery limit of 50% of Table A amount in any year. This is to provide a sensitivity analysis to illustrate the potential effect of restrictions similar to those experienced during the period of 2008-2010.

An additional hypothetical year was added at the end of the 1947-1951 drought (the worst historical drought on record for the Santa Ynez River) to simulate a 6-year critical drought period. For this sixth year, deliveries from Gibraltar, Mission Tunnel, and SWP are assumed to be the average of the preceding five years of drought. Cachuma is assumed to have negligible inflow during year six and the 5-year modeled yield is stretched out over the 6-year period. The charts illustrate how the City's water supplies would be used in the most cost effective manner to meet the projected demand during varying water supply conditions, ranging from very wet to very dry. The worksheet was used to explore the potential to defer the use of desalination at least until the sixth year of a drought.

Three scenarios are represented:

- The first represents “Current Conditions”, with Cachuma entitlement of 8,277 AFY and no use of the safety margin.

- The second represents the near-term condition with Cachuma entitlement also at 8,277, but with a 10% safety margin included.

- The third represents 2030 conditions, with projected future Cachuma entitlement at 7,863 AFY and 10% safety margin included.

Planned demand reductions during the critical drought period are set at 10% in year 4, 15% in year 5, and 15% in year 6.

A category called “Drought Supplies” is used to indicate water that would be used defer the use of desalination, either from unused State Water that is banked for use during dry periods or from the purchase of water during the critical drought period. The worksheet estimates that approximately 4,400 AF of unused State Water would be available for banking if contractual arrangements could be made to store the water for future use. Assuming a 50% deduction for the service of banking the water, about 2,200 AF of water would be available to meet the need for drought supplies. Water purchases would be pursued if additional water were needed. The desalination facility is proposed to remain a part of the City’s water supply and would be used, if needed, to address shortages remaining after the use of banked water and purchased water.

The worksheet uses supplies as needed to meet the water supply target according to the following sequence of priorities:

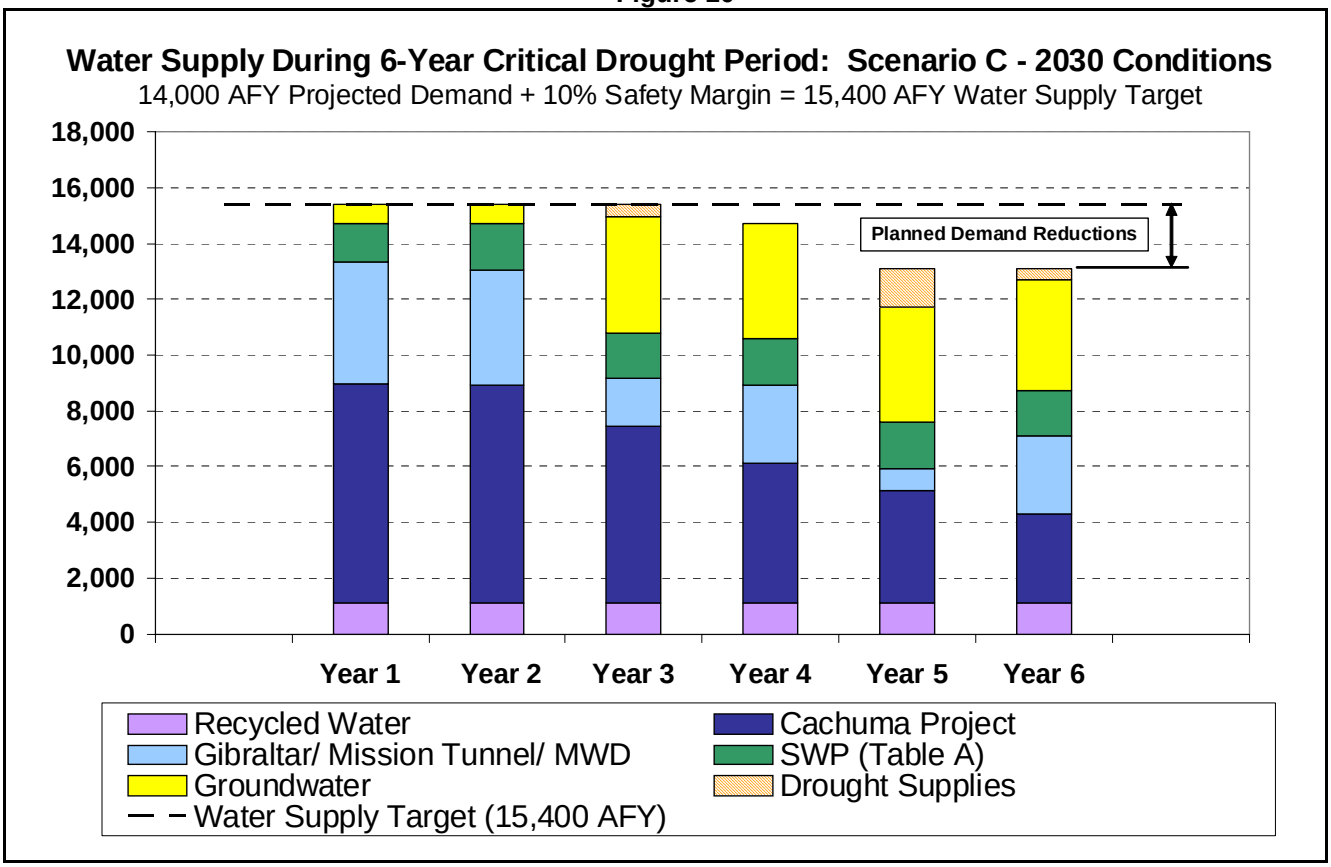
1. All available water from Gibraltar, Mission Tunnel and the Montecito Water District transfer, plus the 1,100 AFY of recycled water;
2. Minimum groundwater usage of 700 AFY;
3. The City’s “exchange water” obligation of SWP Table A water (600 AFY);
4. Available Cachuma entitlement (except that remaining SWP Table A water is taken in year 2 and later to preserve available Cachuma water)
5. Remaining available SWP Table A water;
6. Added groundwater pumping up to the maximum amount of 4,150 AFY, subject to a cumulative pumping limit to minimize seawater intrusion;;
7. Deliveries of “Drought Supplies” (banked water or purchased water as available) through SWP facilities.
8. Desalination (if necessary)

The worksheet is set up to invoke Planned Demand Reductions in years 4, 5, and 6 prior to taking delivery of Drought Supplies. The cumulative drawdown of available groundwater is tracked.

The water supply charts illustrate that the City’s water supply can be met in most years with limited groundwater pumping, an average of only about 75% of available State Water, no drought supplies (banked water, purchased water, or desalination), and no need for extraordinary demand reductions. The real test of the water supply is the six-year critical drought period, beginning with model year 1947. Note that the sixth year is a hypothetical year

that extends the historical 5-year drought to a 6-year drought. The 6-year critical drought period is highlighted in Figure 10 below.

Figure 10



Key points illustrated include:

- Years 1 & 2: much like any non-drought year (mostly surface water, plus limited groundwater pumping)
- Year 3: Cachuma deliveries reduced to stretch remaining supplies; maximum groundwater pumping begins; small amount of Drought Supplies required
- Year 4: First year of Planned Demand Reductions (4% of allowed 10%); further reduction at Cachuma is offset by some increased inflow at Gibraltar; no Drought Supplies required
- Year 5: 15% Planned Demand Reductions; 1,364 AF of Drought Supplies taken; zero water delivered from Gibraltar
- Year 6: 15% Planned Demand Reductions; maximum pumping constrained slightly by the cumulative limit; some Drought Supplies required as a result; rainfall provides water from Gibraltar, but not enough to increase Cachuma deliveries.

Single Dry Year and Three Year Dry Periods

As discussed above, the City's diverse water supply and multi-year storage capacity at Lake Cachuma minimize the effect of a single dry year. An example is 1977 where rainfall in the local (Santa Ynez River) and State Water Project watershed were below average. The water supply charts illustrate that State Water deliveries are significantly reduced, but local surface

water deliveries remain about average and the small difference is made up with added groundwater, with no need to implement any extraordinary measures. A dry period over the next three years is best illustrated by Year 1 through Year 3 in Figure 10.

Water Quality Impacts on Reliability

Water quality has potential impacts on the City's water supply in three areas:

- Reaction of Dissolved Organic Material to Produce Disinfectant Byproducts: More stringent State drinking water standards for disinfection byproducts have been adopted, causing the potential for violations due to relatively high levels of dissolved organics in water coming to Cater Treatment Plant from surface water supplies. The City has recently finished a complete rehabilitation of the plant and is in the pilot stage of a study to determine the best manner to insure the Cater water can continue to meet applicable standards for disinfection byproducts. Several feasible options have been identified and it is expected that facilities can be constructed to successfully address the problem.

- Groundwater Quality: Much of the City's groundwater supply exceeds secondary standards for taste and odor, as well as iron and manganese. In the Foothill Basin, the levels are low enough that they can be successfully treated at the wellhead. In Storage Unit No. 1, water has traditionally been pumped to the Ortega Groundwater Treatment Plant before being put into the distribution system. A complete overall of the plant is planned. It has just completed the pilot phase and is being designed. The completed project will allow full use of the City's groundwater resources and may play a part in complying with new standards for disinfection byproducts mentioned above.

- Recycled Water: Due to hardness of local water supplies, many customers use the ion exchange process to soften water at their homes and businesses. The result is added salt, particularly sodium chloride, in the City's recycled water. This has been addressed by monitoring salt levels in the soil over a ten-year period and by blending potable water with recycled supplies to meet water quality standards for irrigation. The City also promotes the use of potassium chloride as a substitute for sodium chloride.

Water Shortage Contingency Plan

On November 1, 1988 the City Council adopted a Drought Contingency Plan in anticipation of worsening drought. While the plan provided useful guidance during the drought, the City's experience during the drought suggested that a revised plan should have more flexibility. This is especially important with the increased diversity of the City's current water supply. Accordingly, the original Drought Contingency Plan has been updated and is included herein.

The plan is intended to provide guidance, rather than absolute direction, for City action in response to water shortage. The stages are defined in relation to maximum acceptable shortage of 10% - 15% per policy in the updated Long-Term Water Supply Plan. A moving 12-month total of production is used to monitor water usage during periods of normal supply and during water shortages, with actual consumption compared to the target on a monthly basis.

Water Use Restrictions

Chapter 14.20 of the Santa Barbara Municipal Code (applicable portions attached as Appendix F) defines specific water use restrictions that apply during water shortage conditions, subject to Council direction. These include the following:

1. Prohibition on water waste (prohibited at all times regardless of stage);
2. Runoff prohibited (prohibited at all times regardless of stage);
3. Use of potable water prohibited when recycled water is available and deemed feasible (applicable at all times regardless of stage);
4. Restaurant notices required; no water service without request;
5. Prohibition on hosing of hard surfaces;
6. Operation of ornamental fountains prohibited;
7. Water shortage notices required in hotel/motel rooms;
8. Restrictions on irrigation (degree of restriction may vary from night-time irrigation only to complete prohibition on irrigation, except by hand-held bucket);
9. Shut-off nozzle required for boat and vehicle washing;
10. Introduction of water to swimming pools restricted;
11. Potential interruption of service to irrigation meters.

Action under each shortage stage includes a determination as to which, if any, of the above measures are necessary.

Rates and Revenue Issues

Since 1989 the City has used an inverted block rate billing system providing standardized allotments for residential customers based on the type of building and number of dwelling units. Fiscal Year 2011 rates are shown in Appendix G. Historical usage has not been used as the basis for allotments since it tends to penalize customers who practice efficient water use. Commercial and industrial allotments are based on historical off-peak usage since standardized allotments are infeasible for such customers. The system worked well during the 1987-1992 drought when allotments and block prices were modified as necessary to shape demand and insure adequate revenue. The system proved to be workable even for the 50% shortages experienced. It is important to note that even severely increased rates will have the mixed effect of reducing demand and providing added revenue to offset losses from reduced overall consumption. The City's experience has been that block prices and allotments are best determined based on actual circumstances rather than trying to determine appropriate values in advance based on hypothetical situations. It is important to note that a continuing decline in demand will result in increased unit rates to generate the revenue required to fund the mostly fixed costs of operating the water system.

Normal Supply Stage

Definition: Supplies are considered normal when the projected water supply availability is sufficient to equal or exceed the projected normal demand for the next three years.

Actions:

- ⇨ Continue efforts to preserve water supply sources, such as management of watersheds to minimize siltation, banking of water as feasible to firm up deliveries through the State Water Project, and development of optimal groundwater pumping capacity;
- ⇨ Continue promotion of long-term water conservation practices designed to improve efficiency without impacting lifestyles, including high efficiency plumbing retrofits, low water using landscaping, efficient irrigation practices, public information regarding water awareness, and inverted block rate pricing;
- ⇨ Extend the use of recycled water where feasible and cost effective;
- ⇨ Monitor demand in terms of actual consumption and cumulative commitments to serve;
- ⇨ Water use restrictions are limited to prohibition of water waste.

Stage 1 Water Shortage Condition -- "Water Shortage Watch"

Definition: A short-term water shortage condition declared by Resolution of the City Council upon being advised that projected supply availability during the next three years may be approximately 10% less than projected normal demand.

Actions:

- ⇨ Staff prepares a report to the Water Commission and City Council addressing:
  - Status of surface water supplies;
  - Status of City's groundwater resources and pumping capability;
  - Availability of desalination facility and related cost and permitting issues;
  - Projected deliveries of State Water Project entitlement;
  - Anticipated availability of banked water and one-time purchase of water through the State Dry Weather Purchase Program or other short term transfers of water;
  - Possible reduction in Cachuma deliveries to City in excess of reductions agreed to by member units to allow build-up of City carryover at Cachuma.
  - A range of water supply scenarios based on various levels of assumed rainfall;
- ⇨ Water Commission and City Council consider Staff recommendation regarding adoption of a resolution declaring a Stage I Water Shortage Condition.
- ⇨ Cachuma Project deliveries reduced by up to 20% as agreed by Member Units when Project storage drops below 100,000 AF;
- ⇨ Public advised of the City's water supply situation; extraordinary reductions in water use are not anticipated to be necessary at this stage.
- ⇨ Water use restrictions are limited to prohibition of water waste.

Stage 2 Water Shortage Condition -- "Water Shortage Alert"

Definition: A short-term water shortage condition declared by Resolution of Council upon being advised that projected supply availability during the current or impending water year is anticipated to be approximately 10% less than projected normal demand.

Actions:

- ⇨ Staff prepares a report to the Water Commission and City Council addressing:
  - Updated water supply scenarios based on various levels of assumed rainfall;
  - Need for:
    - ✓ Demand reduction by the public;
    - ✓ Water use restrictions;
    - ✓ Design and permitting work associated with temporary water supply augmentations;
    - ✓ Possible activation of the desalination facility;
  - Revenue projections and appropriate changes in water rates;
- ⇨ City Council considers staff and Water Commission recommendation regarding adoption of a resolution declaring a Stage II Water Shortage Condition.
- ⇨ Public advised of need for 10% added water conservation savings.
- ⇨ City Council considers need to begin planning and design work for activation of the desalination facility.
- ⇨ Suspension of development approvals is considered.
- ⇨ Determine the need for water use restrictions pursuant to SBMC Section 14.20.215 and incorporate appropriate exemptions into the water shortage resolution.
- ⇨ Public information effort is aimed at advising the public regarding:
  - The City's water supply situation;
  - Efforts being made by the City to minimize impacts of the water shortage;
  - The public's role in achieving demand reductions;
  - Staff enforces water use restrictions, pursuant to Council direction; and
  - Staff implements rate changes, pursuant to Council direction.

Stage 3 Water Shortage Condition -- "Water Shortage Emergency"

Definition: A short-term water shortage condition declared by Resolution of Council upon being advised that there is a projected supply shortage of greater than 10% as compared to the projected normal demand.

Actions:

- ⇨ Staff prepares a report to the Water Commission and City Council addressing:
  - Updated water supply scenarios based on various levels of assumed rainfall;
  - Need for:
    - ✓ Further demand reduction by the public;
    - ✓ Increased water use restrictions, including potential prohibition on uses other than drinking water and sanitation;
    - ✓ Accelerated design, permitting, and construction work associated with temporary water supply augmentations;
  - Review of revenue projections and appropriate changes in water rates;
  - Evaluate supply availability from desalination facility:
- ⇨ City Council considers staff and Water Commission recommendation regarding adoption of a resolution declaring a Stage III Water Shortage Emergency Condition pursuant to

California Water Code, Chapter 3.

- ⇨ Revised demand reduction target is announced to public, accompanied by information about how to achieve required reductions and efforts being made by the City to resolve the water shortage condition.
- ⇨ Water use restrictions adjusted as necessary pursuant to Santa Barbara Municipal Code Section 14.20.215.B.
- ⇨ Project potential need for activating desalination facility, including potential expansion of capacity.
- ⇨ Evaluate revenues and the need for further rate changes; staff implements changes pursuant to Council direction.
- ⇨ Consider further action regarding suspension of development approvals.
- ⇨ Water use restrictions enforced by staff pursuant to Council direction.

While the City's long-term supply planning is based on a maximum planned shortage of 10% - 15%, unforeseen circumstances may result in the need to respond to shortages of up to 50%. Based on the City's experience with the 1987-1991 drought, the measures identified above are expected to be useful in achieving short-term demand reductions of up to 50%, carefully tailored to the situation at hand. Flexible application of block rates and allotments, water use restrictions, and public information will be used to meet the required demand reduction target. Steeply inclined block rates would partially offset lost revenue due to demand reductions. City reserve policies dictate maintaining Water Fund reserves at about $12 million (about 30% of annual budget) to address a variety of contingencies. This will also help mitigate revenue impacts associated with a severe shortage. In addition, a separate $3 million reserve is maintained for potential reactivation of the City's desalination facility, or other capital projects associated with severe drought.

Measuring and Monitoring Actual Reductions

Water is produced into the distribution system to meet the demand. Therefore measurement of water production is a simple mechanism for monthly, weekly, or even daily monitoring of water demand to determine the effectiveness of demand reduction measures. Such monitoring proved feasible and useful during the previous severe drought.

Catastrophic Supply Interruption

Besides drought, the City may experience a catastrophic interruption of the water supply as a result of natural disasters such as earthquake or tsunami, a regional power outage, terrorism, wildfire, or sabotage. Emergency administrative procedures are detailed and kept updated in the City's Emergency Operations Center Manual. Noted below are planning and response measures particularly associated with the City's water supply.

Preparations for responding to catastrophic events:

- A diverse portfolio of supplies provides redundancy that increases the likelihood of being able to meet emergency needs even under catastrophic conditions.

- Primary water supply sources and the main treatment plant have been planned to flow to the City by gravity to reduce normal operating costs and minimize disruption during disasters.
- A groundwater production system has been developed and maintained to augment supplies to the distribution system or provide direct emergency drinking water supplies should the distribution system be put out of service. In the event of prolonged power outage, power would be provided by portable generators.
- Back-up power supplies with automatic transfer switching and SCADA control capability have been installed at the primary water treatment plant and critical distribution pump stations.
- The potentially unstable and uncovered Sheffield Reservoir has been demolished and replaced with underground tanks designed and built to current seismic standards.
- Computerized telemetry system (SCADA) is being provided throughout the distribution system to monitor system problems, whether minor day-to-day problems or major disruptions.
- An ongoing program of water main replacement targets sections of the distribution system with the highest history of breaks.
- Upgraded security, including more secure fencing, video monitoring, and alarms, is being provided at all water supply facilities.
- Public access to water supply facilities has been limited for security reasons.
- City distribution system crews are trained in pipe repair and replacement as a part of their normal duties and are continually ready to perform such work on an emergency basis as needed.
- All City employees are designated as emergency service workers and would be activated to do damage assessment and repairs, and to fill gaps left by staff that live out of town and may be unable to get to Santa Barbara due to disaster.
- The City's emergency response program includes emergency communications procedures that would be used for notifying the public about emergency water use restrictions, potential need to boil tap water prior to drinking, and locations where drinking water is available in the event of widespread distribution system failure.

Actions to be implemented during catastrophic conditions:

- Mobilization:
    - Supervisors assemble at Public Works Yard, 630 Garden Street
    - Determine which staff are present and which need to be contacted
    - Contact absent staff and direct them to report once families are safe
    - Check status of all equipment, refuel, and restock supplies on vehicles
    - Water Resources Laboratory staff mobilize at City lab and prepare for anticipated water quality test requests
- Dispatch crews to inspect, patrol, and report on condition of facilities and distribution piping in designated areas of the system:

<u>Group A</u>:

Vic Trace Reservoir & La Coronilla Pump Station
La Mesa Reservoir
Escondido Reservoir & Pump Station

Hope (Calle Las Caleras) Pump Station,
Hope Reservoir
Campanil Hills Pump Station

Group B:
Reservoir No. 1
East Reservoir & Bothin Pump Station
El Cielito Reservoir and Skofield Pump Station
Skofield Reservoir
La Vista Reservoir
Northridge Pump Station

Group C:
Reservoir No. 2
Sheffield Reservoirs No. 1 and No. 2 and El Cielito Pump Station
South Portal of Mission Tunnel
Rocky Nook Pump Station
Sheffield Pump Station
Tunnel Road Reservoir & Pump Station
Cater Cross-Tie Pump Station

Group D:
Wastewater Lift Stations at:
Campanil
Braemar
Cliff Drive
Linda Lane
El Camino De la Luz

Group E:
Wastewater Lift Stations at:
Skofield
La Colina
Via Lucero
Tallant Road
Miradero Lane
Andante
Vista Elevada

- Assign qualified staff to use SCADA telemetry system, to the extent it is still functional, to determine the extent of system damage and the most critical isolation points on the distribution system.
- Conduct a complete inspection of the Cater Water Treatment Plant and Ortega Groundwater Treatment Plant to determine status and extent of damage.
- Contact Cachuma Project operators (USBR and COMB) to determine condition of Bradbury Dam and related facilities.
- Contact the City's dam caretaker at Gibraltar Reservoir to determine condition of Gibraltar Dam and related facilities.
- Assess condition of City groundwater wells by measuring water levels and well depth, and taking water samples for analysis of water quality.
- Assess the condition of two tunnels (Tecolote Tunnel from Lake Cachuma and Mission Tunnel from Gibraltar Reservoir) by measuring flow from the tunnels. While earthquake

may result in tunnel collapse, it is likely that some residual flow from tunnel infiltration will be available and will flow to the City's treatment plant by gravity.

- Assign qualified staff to utilize the City's hydraulic computer model to simulate identified field deficiencies and run scenarios to identify the most efficient repair, isolation, or reconstruction recommendations.
- Prioritize distribution system repairs to best meet critical needs, including fire fighting, drinking water, and sanitation; consider reserving a portion of available potable supply for drinking water purposes in the event of prolonged interruption.
- Develop materials list for treatment plant and distribution system repairs and communicate with potential suppliers.
- Allocate available portable generators and pumps according to highest need for groundwater wells, flood remediation, sanitation, firefighting, or powering emergency facilities.
- Develop a clear message for dissemination to the public regarding:
    - Status of distribution system
    - Water use prohibitions
    - Allowable water uses
    - Potential need to boil drinking water prior to consumption
    - Location and availability of emergency drinking water in the event of distribution system failure.

Potential Catastrophic Interruption Scenarios

Given the diversity of the City's water supply, there is a range of catastrophic supply interruption scenarios that may occur. At the extreme end of the range, a catastrophic seismic event could include failure of both Gibraltar Dam and Bradbury Dam (Lake Cachuma), also impacting State Water deliveries. Damage to groundwater wells would be expected as well. Table 14 summarizes some foreseeable interruptions of lesser, but more probable, magnitude. In an actual event, detailed analysis would be conducted to assess the extent and duration of interruption and the alternatives for short term replacement of lost supplies.

Table 14
Catastrophic Interruption Scenarios

Description	Projected Water Supply Reduction	Anticipated Duration	Response
Damage limited to distribution system: Main breaks in various parts of the City	No reduction in supply; delivery capability interrupted to portions of the City	Ranging from days to months depending on extent of damage	• Valve off damaged sections • Inventory customers without service & provide for access to emergency drinking water as necessary • Prioritize repair efforts based on health, safety, and sanitation
Collapse of Mission Tunnel: Supplies from Gibraltar Reservoir and Mission Tunnel infiltration interrupted	Initial loss of 35% to 50% of potable supplies; reduced to 12% to 27% by increasing Cachuma deliveries and groundwater pumping	Ranging from months to a year or more	• Assess extent of remaining tunnel flow • Restrict irrigation uses • Water usage restrictions, pricing, and public notification to reduce water use to targeted level based on actual circumstances • Consider increases in State Water Project delivery requests • Initiate emergency design and construction process for repair of tunnel
Collapse of Tecolote Tunnel: Supplies from Lake Cachuma, tunnel infiltration, and State Water Project interrupted	Initial loss of 50% to 65% of potable supplies; reduced to 15% to 30% by increasing Gibraltar deliveries and groundwater pumping	Ranging from months to a year or more	• Assess extent of remaining tunnel flow • Curtail most or all irrigation uses • Water usage restrictions, pricing, and public notification to reduce water use to targeted level based on actual circumstances • Consider extent to which supplies are available to assist neighboring agencies affected by loss of Cachuma deliveries • Participate with COMB & USBR in emergency design and construction process for repair of tunnel
Collapse of both Tecolote and Mission Tunnels: Supplies from Cachuma, Tecolote Tunnel infiltration, State Water Project, Gibraltar Reservoir and Mission Tunnel infiltration interrupted	Initial loss of up to 100% of normal potable supplies; reduced to 66% by initiating groundwater pumping	Ranging from months to a year or more	• Assess extent of remaining tunnel flow • Activate all available groundwater wells at maximum production levels • Consider public notification to accumulate emergency personal drinking water supplies while distribution system remains functional • Curtail all customer use other than water used for drinking – priority will be to maintain all available supplies and distribution capability for drinking water, sanitation, and firefighting • Initiate selected shut-down of portions of the distribution system to maintain functional pressure and flow in the remaining system; priority areas will be identified based on firefighting needs and feeding emergency drinking water distribution stations • Consider shutting off customer service connections to assist in maintaining distribution system functionality • Initiate emergency design and construction process for repair of tunnels • Initiate emergency design and construction process for reactivation of desalination facility for mid-range contribution to water supplies

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Section 6: Demand Management Measures

The City is a long-term leader in water conservation. The City's Water Conservation Program began as a response to drought in the late 1970's. In 1988, the Water Conservation Program was expanded pursuant to recommendations in the City's Five-Year Water Policy Action Plan. The program experienced increased participation due to the 1987-1991 California Drought. The subsequent 1994 Long Term Water Supply Program identified a goal of 1,500 AFY of additional water conservation, at target that was met and exceeded.

The City's current Water Conservation Program is a combination of the City's commitment to carrying out the California Urban Water Conservation Council's (CUWCC) Best Management Practices and the City's dedication to water conservation as an element of the 2011 Long-Term Water Supply Plan.

The City joined the CUWCC in January 1992 by signing the Memorandum of Understanding Regarding Urban Water Conservation. Since that time, the City has been actively carrying out the Best Management Practices as well as additional water conservation measures.

Earlier sections of this plan detail the analysis that went into determining the appropriate conservation measures for cost effectively managing the City's water demand and complying with urban water use targets. Appendix D summarizes the Water Conservation Technical Evaluation completed by Maddaus Water Management in October 2010. Appendix H includes the City's CUWCC reports documenting ongoing compliance with the MOU.

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Appendix A:

Documentation of Public Noticing,

Community Notifications, Interagency Coordination,

and City Council Action

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City of Santa Barbara

City Clerk's Office

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PUBLIC NOTICE
City of Santa Barbara

NOTICE IS HEREBY GIVEN that the City Council of the City of Santa Barbara will conduct a Public Hearing on Tuesday, June 14, 2011, during the afternoon session of the meeting which begins at 2:00 p.m. in the Council Chamber, City Hall, 735 Anacapa Street, Santa Barbara. The hearing is to consider a recommendation to adopt the 2010 update of the City's Urban Water Management Plan (UWMP) as required by State law, and to adopt the City's updated Long Term Water Supply Plan (LTWSP), which is the basis for water supply information in the UWMP. The meeting is open to the public. Questions can be directed to the City's Water Hotline at (805) 564-5460.

Drafts of the UWMP and LTWSP will be available as a news item on the City's homepage at www.SantaBarbaraCa.gov beginning Tuesday, May 24, 2011. Any comments are requested by 12:00 noon, Friday, June 3, 2011 so they can be considered in preparation of the final drafts to be included in the City Council packet for the hearing on June 14, 2011. Written comments should be addressed to the City Council via the City Clerk's Office, P.O. Box 1990, Santa Barbara, CA 93102-1990. You are also invited to attend the hearing and address your comments to the City Council.

On Thursday, June 9, 2011, an Agenda with all items to be heard on Tuesday, June 14, 2011, will be available at 735 Anacapa Street and at the Central Library. Agendas and Staff Reports are also accessible online at www.SantaBarbaraCA.gov; under Quick Links, click on Current Council Agenda & Packet. Regular meetings of the Council are broadcast live and rebroadcast on Wednesdays and Thursdays at 7:00 p.m. and on Saturday at 9:00 a.m. on Channel 18. These meetings can also be viewed over the Internet at www.santabarbaraca.gov: Click on the Government tab, click City Council Meeting Videos (under Quick Links), and then click on the Video link for the meeting date.

In compliance with the Americans with Disabilities Act, if you need special assistance to gain access to, comment at, or participate in this meeting, please contact the City Administrator's Office at 564-5305 or inquire at the City Clerk's Office on the day of the meeting. If possible, notification at least 48 hours prior to the meeting will enable the City to make reasonable arrangements in most cases.

(SEAL)

Cynthia M. Rodriguez, CMC
City Clerk Services Manager
May 24, 2011

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Proof of Publication
(2015.5C.C.P)

Superior Court of
the State of California
In and for The County of Santa Barbara

Envelope No. 42322

In the Matter of: **PUBLIC NOTICE**

The undersigned, being the principal clerk of the printer of the Santa Barbara News Press, a newspaper of general circulation, printed and published daily in the City of Santa Barbara, County of Santa Barbara, California and which newspaper has been adjudged a newspaper of general circulation by the Superior Court in the County of Santa Barbara, State of California, Adjudication Number 47171; and that affiant is the principal clerk of said Santa Barbara News Press. That the printed notice hereto annexed was published in the SANTA BARBARA NEWS-PRESS, in the issues of the following named dates

MAY 24, 29, 31 / 2011

all in the year 2011 I hereby certify (or declare) under penalty of perjury that that foregoing is true and correct.

Executed on this 1st of JUNE 2011 at Santa Barbara, CA.

Signature

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City of Santa Barbara

NOTICE IS HEREBY GIVEN that the City Council of the City of Santa Barbara will conduct a Public Hearing on Tuesday, June 14, 2011, during the afternoon session of the meeting which begins at 2:00 p.m. in the Council Chamber, City Hall, 735 Anacapa Street, Santa Barbara. The hearing is to consider a recommendation to adopt the 2010 update of the City's Urban Water Management Plan (UWMP) as required by State law, and to adopt the City's updated Long Term Water Supply Plan (LTWSP), which is the basis for water supply information in the UWMP. The meeting is open to the public. Questions can be directed to the City's Water Hotline at (805) 564-5460.

Drafts of the UWMP and LTWSP will be available as a news item on the City's homepage at www.SantaBarbaraCa.gov beginning Tuesday, May 24, 2011. Any comments are requested by 12:00 noon, Friday, June 3, 2011, so they can be considered in preparation of the final drafts to be included in the City Council packet for the hearing on June 14, 2011. Written comments should be addressed to the City Council via the City Clerk's Office, P.O. Box 1990, Santa Barbara, CA 93102 1990. You are also invited to attend the hearing and address your comments to the City Council.

On Thursday, June 9, 2011, an Agenda with all items to be heard on Tuesday, June 14, 2011, will be available at 735 Anacapa Street and at the Central Library. Agendas and Staff Reports are also accessible online at www.SantaBarbaraCA.gov; under Quick Links, click on Current Council Agenda & Packet. Regular meetings of the Council are broadcast live and rebroadcast on Wednesdays and Thursdays at 7:00 p.m. and on Saturday at 9:00 a.m. on Channel 18. These meetings can also be viewed over the Internet at www.santabarbaraca.gov: Click on the Government tab, click City Council Meeting Videos (under Quick Links), and then click on the Video link for the meeting date.

In compliance with the Americans with Disabilities Act, if you need special assistance to gain access to, comment at, or participate in this meeting, please contact the City Administrator's Office at 564-5305 or inquire at the City Clerk's Office on the day of the meeting. If possible, notification at least 48 hours prior to the meeting will enable the City to make reasonable arrangements in most cases.

Cynthia M. Rodriguez, CMC
City Clerk Services Manager

MAY 24, 29, 31 / 2011 -- 42322

Santa Barbara Daily Sound

Proof of Publication (2015.5C.C.P.)

Superior Court of
The State of California
In and for The County of Santa Barbara

In the Matter of: Public Notice- 6/14 Hearing for UWMP & LTWSP

Case Numbers:

The undersigned, being the principal clerk of the printer of the Santa Barbara Daily Sound, a newspaper of general circulation, printed and published in the City of Santa Barbara, County of Santa Barbara, California and which newspaper has been adjudged a newspaper of general circulation by the Superior Court in the County of Santa Barbara, State of California, Adjudication Case No. 1243692; and that affiant is the principal clerk of said Santa Barbara Daily Sound. That the printed notice hereto annexed was published in the Santa Barbara Daily Sound, in the issue(s) following named date(s)

May 24 and 31, 2011

I hereby certify (or declare) under penalty of perjury that the forgoing is true and correct.

Executed on May 31, 2011

Allen Feld

Allen Feld

PUBLIC NOTICE
City of Santa Barbara

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(SEAL)

_____
Cynthia M. Rodriguez, CMC
City Clerk Services Manager

STATE OF CALIFORNIA)
)
COUNTY OF SANTA BARBARA) ss.
)
CITY OF SANTA BARBARA)

I, Cynthia M. Rodriguez, City Clerk Services Manager in and for the City of Santa Barbara, California, DO HEREBY CERTIFY that the minute order is a true and correct copy of the record of the City Council proceedings concerning the meeting on June 14, 2011, Item No. 15, Adoption Of Long-Term Water Supply Plan And Urban Water Management Plan.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the official seal of said City to be affixed this 13th day of July, 2011.

(SEAL)

Cynthia M. Rodriguez
City Clerk Services Manager

CITY OF SANTA BARBARA
CITY COUNCIL

MINUTE ORDER

DATE June 14, 2011

ROLL CALL Mayor Helene Schneider, Councilmembers Dale Francisco, Frank Hotchkiss, Grant House, Randy Rowse, Michael Self, Bendy White

ITEM No. 15 (Administrative Item)

Subject: Adoption Of Long-Term Water Supply Plan And Urban Water Management Plan (540.08)

RECOMMENDATION That Council:

A. Hold a Public Hearing regarding adoption of the City's updated Long-Term Water Supply Plan (LTWSP) and the 2010 update of the City's Urban Water Management Plan (UWMP);
B. Adopt the City's updated LTWSP as the policy basis for management of the City's water supply for the period through approximately 2030; and
C. Adopt and authorize the Public Works Director to transmit the City's updated UWMP to the California Department of Water Resources, such adoption to include modifications as may be approved by the Public Works Director to ensure compliance with State UWMP requirements, provided that any such modifications are not inconsistent with the updated LTWSP.

ACTION Councilmembers House/White to approve the recommendations.

Unanimous voice vote

Ferguson, Bill

From: Ferguson, Bill
Sent: Friday, May 27, 2011 11:55 AM
To: 'allen@co.santa-barbara.ca.us'
Subject: Urban Water Management Plan - City of Santa Barbara

Notice of Public Hearing (Pursuant to California Water Code, Section 10642)

The City has posted a draft of its 2010 Urban Water Management Plan (UWMP) for public review and comment. This is a State mandated document that demonstrates compliance with water management requirements, including recently adopted mandatory targets for Statewide water conservation.

Also posted is a draft of the City's Long Term Water Supply Plan, which will update the 1994 version. This is a City policy document that was the basis for the water supply analysis in the UWMP.

The documents can be accessed at: www.santabarbaraca.gov\water

A public hearing is scheduled for June 14, 2011 at 2:00 p.m. in the City Council Chamber, 735 Anacapa Street. Written comments are requested by June 3, 2011 for consideration before preparation of the final draft and should be addressed to the City Council via the City Clerk's Office, P.O. Box 1990, Santa Barbara, CA 93102-1990. You are also invited to attend the hearing and address your comments to the City Council.

Questions can be directed to 564-5460.

Bill Ferguson, Water Resources Supervisor
City of Santa Barbara Public Works Department
P.O. Box 1990, Santa Barbara, CA 93102
Street Address: 630 Garden Street, Santa Barbara, CA 93101
Phone: (805) 564-5571
FAX: (805) 897-2613
E-mail: BFerguson@SantaBarbaraCA.gov

Ferguson, Bill

From: Lancy, Theresa
Sent: Thursday, May 26, 2011 2:02 PM
To: Lancy, Theresa
Cc: Ferguson, Bill
Subject: Draft Urban Water Management Plan Posted

Greetings,

The City has posted a draft of its 2010 Urban Water Management Plan (UWMP) for public review and comment. This is a State mandated document that demonstrates compliance with water management requirements, including recently adopted mandatory targets for Statewide water conservation.

Also posted is a draft of the City's Long Term Water Supply Plan, which will update the 1994 version. This is a City policy document that was the basis for the water supply analysis in the UWMP.

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Please feel free to contact Bill Ferguson at bferguson@santabarbaraca.gov or 564-5571, if you have any questions.

Bill Ferguson, Water Resources Supervisor
City of Santa Barbara Public Works Department
P.O. Box 1990, Santa Barbara, CA 93102
Street Address: 630 Garden Street, Santa Barbara, CA 93101
Phone: (805) 564-5571
FAX: (805) 897-2613
E-mail: BFerguson@SantaBarbaraCA.gov

Ferguson, Bill

From: Ferguson, Bill
Sent: Wednesday, May 25, 2011 7:42 PM
To: 'jlb@ccwa.com'; 'JMcInnes@goletawater.com'; 'tom@montecitowater.com'; 'charles@cvwd.net'; 'cdahlstrom@syrwd.org'; 'bwales@syrwcd.com'; 'ESalazar@usbr.gov'; dwilliams@mp.usbr.gov; Mike Alvarado
Cc: Bjork, Rebecca; Taylor, Catherine; Lancy, Theresa; Jordan, Alison; Shelton, Barbara; Landon Neustadt (lneustadt@lagunablanca.org); Barry Keller (kyrrab.cal@verizon.net); jasmith181 @aol.com; Bill Thomas (BLT83@cox.net); Russell Ruiz (ruizsblaw@cox.net); Russell Ruiz
Subject: Draft Urban Water Management Plan Posted

The City has posted a draft of its 2010 Urban Water Management Plan (UWMP) for public review and comment. This is a State mandated document that demonstrates compliance with water management requirements, including recently adopted mandatory targets for Statewide water conservation.

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Please feel free to contact me at 564-5571, if you have any questions.

Bill Ferguson, Water Resources Supervisor
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Street Address: 630 Garden Street, Santa Barbara, CA 93101
Phone: (805) 564-5571
FAX: (805) 897-2613
E-mail: BFerguson@SantaBarbaraCA.gov

Ferguson, Bill

From: Ferguson, Bill
Sent: Wednesday, May 25, 2011 7:30 PM
To: 'info@sbhispanicchamber.org'; 'info@GSBLRA.org'; 'citizensplanningsb@gmail.com'; 'sharon@mcasb.org'; 'brianp@vistapro.com'; 'President@sb-allied.org'; 'evangeline@aiasb.com'; 'ddavis@cecmail.org'; 'jnisbet@sbaor.com'; 'steve@sbchamber.org'; 'bcollyer@sbdo.org'; 'cao@co.santa-barbara.ca.us'; 'mnaftal@cosbpw.net'
Subject: Draft Water Supply Plans Available - City of Santa Barbara

The City has posted a draft of its 2010 Urban Water Management Plan (UWMP) for public review and comment. This is a State mandated document that demonstrates compliance with water management requirements, including recently adopted mandatory targets for Statewide water conservation.

Also posted is a draft of the City's Long Term Water Supply Plan, which will update the 1994 version. This is a City policy document that was the basis for the water supply analysis in the UWMP.

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Questions can be directed to 564-5460.

Bill Ferguson, Water Resources Supervisor
City of Santa Barbara Public Works Department
P.O. Box 1990, Santa Barbara, CA 93102
Street Address: 630 Garden Street, Santa Barbara, CA 93101
Phone: (805) 564-5571
FAX: (805) 897-2613
E-mail: BFerguson@SantaBarbaraCA.gov

City of Santa Barbara

Public Works Department

www.SantaBarbaraCA.gov

Main Office
630 Garden Street
P.O. Box 1990
Santa Barbara, CA
93102-1990

Administration
Tel: 805.564.5377
Fax: 805.897.2613

Engineering
Tel: 805.564.5363
Fax: 805.564.5467

Facilities
Tel: 805.564.5415
Fax: 805.897.2577

Street Maintenance
Tel: 805.564.5413
Fax: 805.897.1991

Transportation
Tel: 805.564.5385
Fax: 805.564.5467

Water Resources
Tel: 805.564.5387
Fax: 805.897.2613

April 13, 2011

Michael Allen, Chief Deputy Clerk of the Board
County of Santa Barbara
105 East Anapamu Street, Room 407
Santa Barbara, CA 93101

SUBJECT: Notification of Public Hearing Regarding Urban Water Management Plan Update

Dear Mr. Allen:

Pursuant to State law, we are hereby providing notice that the City of Santa Barbara is in the process of updating its Urban Water Management Plan. The City Council is scheduled to hold a Public Hearing at 2:00 p.m. on June 14, 2011 in the Council Chambers, City Hall, 735 Anacapa Street in Santa Barbara for the purpose of receiving public input on and considering adoption of the proposed update.

Questions regarding this matter can be directed to Bill Ferguson, Water Resources Supervisor, at (805) 564-5571, or by email at: BFerguson@SantaBarbaraCA.gov.

Thank you.

Sincerely,

Rebecca Bjork
Water Resources Manager

BF/dm

cc: Matt Naftaly, Santa Barbara County Water Agency Manager, 123 East Anapamu Street, Santa Barbara, CA 93101

Ferguson, Bill

From: Ferguson, Bill
Sent: Wednesday, May 11, 2011 11:33 AM
To: 'jlb@ccwa.com'
Cc: Bjork, Rebecca
Subject: UWMP Water Use Projections

Notification of Water Use Projection Data for Urban Water Management Planning

The City of Santa Barbara has reviewed the water use projections provided by Central Coast Water Agency in its letter dated March 29, 2011. We are responding that we expect to use those projections as the basis for expected availability of State Water Table A amounts under the range of water shortage scenarios identified in the current Urban Water Management Plan Guidebook. Such available Table A amounts will be used by the City as appropriate, including for delivery as needed to meet current demands, carryover, sale to other agencies, and/or banking for improved future water supply reliability. In the "Water Supply and Water Shortage Contingency Planning" section of our Urban Water Management Plan update, we also will include a sensitivity analysis based on more conservative assumptions on our water supplies, as a way of illustrating a "worst likely" case performance of our water supply. Please advise if you have any questions.

Thank you for your assistance.

Bill Ferguson, Water Resources Supervisor
City of Santa Barbara Public Works Department
P.O. Box 1990, Santa Barbara, CA 93102
Street Address: 630 Garden Street, Santa Barbara, CA 93101
Phone: (805) 564-5571
FAX: (805) 897-2613
E-mail: BFerguson@SantaBarbaraCA.gov

Appendix B:

Water Service Area Map

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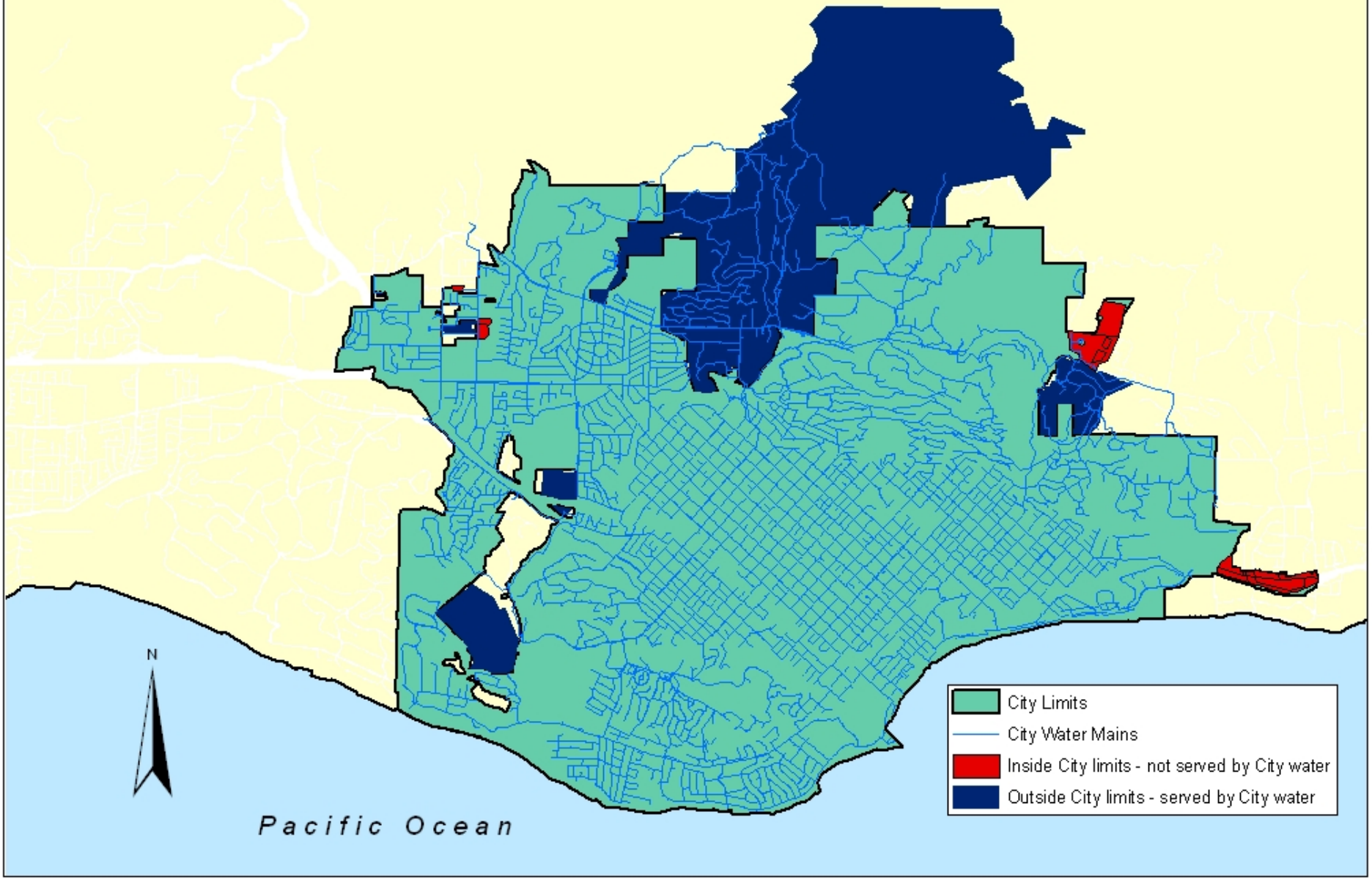
City of Santa Barbara Water Service Area

As Defined by Census Tracts Served by City Distribution System



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Appendix C:

Documentation of Lower-Income Housing Data

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Existing and Projected Housing Units in City of Santa Barbara

	2010 Baseline	**2015**	**2020**	**2025**	**2030**	**Total Projected Housing Units** (2010-2030)
Existing Housing *(2010)*						
Total housing units in City[1] (includes SF & MF units)	37,720 du					
Housing types[2] single-family (53.5%) multiple-family (46.5%)	20,193 du 17,527 du					
Existing lower-income housing units in City[3] (6.8%)	2,580 du					
Projected Housing						
Net increase in housing units in City (incl SF & MF units)[3]		700	700	700	700	2800
Total housing units in City[4]		38,420	39,120	39,820	40,520	40,520
Net increase in lower-income housing units in City[5]		154	154	154	154	616
Total lower income housing units in City[6]		2,734	2,888	3,042	3,196	3196 (7.8%)

Notes:

1. **Total Existing Housing Units in City (2009),**
   Sources: City of Santa Barbara General Plan Housing Element Table H-17 p. 132 (September 2010 Proposed Final); Dept of Finance
2. **Existing Housing Types in City (2009)**
   Sources: City of Santa Barbara General Plan Housing Element Table H-17 p. 132 (September 2010 Proposed Final); Dept of Finance
3. **Existing Lower-Income Housing Units in City (2010) -** Lower Income Housing Units are defined as affordable to 80% of median household income
   Includes single-family (SF) and multiple-family (MF) units w/ recorded affordability agreements (not vouchers & certificates that travel with resident)
   Source: City Housing & Redevelopment Division, Steven Faulstich
3. **Projected Net Increase in Housing Units in City**
   Additional housing unit projections are based on *Plan Santa Barbara* General Plan Certified Final EIR growth assumptions for the Plan Santa Barbara project which estimates build-out of a total of up to 2,800 net new dwelling units between 2010 and 2030.
   Source: Certified Final Environmental Impact Report for *Plan Santa Barbara* General Plan Update (September 2010)
4. **Total Projected Housing Units in City =** Existing 2010 Total Housing Units + Projected Net Increase in Housing units
5. **Projected Net Increase in Lower Income Housing Units in City**
   Source: City of Santa Barbara General Plan Housing Element Table H-47 Quantified Objectives 2007-2014, p. 195 (September 2010 Proposed Final)
   New Construction Objectives 2010-2014: Extremely Low 50 du; Very Low 50 du; Low 110 du = 210 du x 3 = estimated 630 du to 2030, approximately 22% of total 2800 du estimated to build out. Assume 22% of total build-out for each five-year increment of growth.
6. **Total Projected Lower Income Housing Units in City** = Existing 2010 Lower Housing Units + Projected Net Increase in Lower Income Housing Units

Additional Note: Breakdown of Affordable *and* Assisted Housing Units and Shelter/Group Beds in City (June 2010):
2,580 units with recorded affordability agreements (includes senior rental, rental not senior only, resident-owned mobilehome spaces)
340 units owner-occupied and secondary units with recorded affordability agreements
1,375 section 8 certificates and vouchers in use
574 single-family owner-occupied rehabilitation
416 beds in group homes or shelters
5,285

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Appendix D:

Executive Summary:
Water Conservation Technical Evaluation

Maddaus Water Management

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EXECUTIVE SUMMARY

Introduction

This conservation technical analysis was conducted by Maddaus Water Management (MWM) for the City of Santa Barbara (City). The purpose of the analysis is to:

1. Evaluate current conservation measures and identify new conservation measures that will reduce future water demand.
2. Estimate the costs and water savings of these measures.
3. Combine the measures into increasingly more aggressive programs and evaluate the costs and water savings of these programs.

Long-Term Conservation Program Analysis

A list of 92 potential conservation measures was developed from known water saving technologies and services. Twenty-three conservation measures, selected by the City and local stakeholders during an evaluation workshop, were further analyzed by the Least Cost Planning Decision Support System Model (DSS Model). The DSS Model is a planning tool that assists water planners with evaluating alternative water conservation programs. The model itself is an end use model that calculates water savings, costs and benefits from individual measures, and programs of a number of measures. Projections of future water demand with and without water conservation programs are made for the City water service area. Calculations are made for every year in the 30-year analysis period. In addition, twenty one measures, both current and potential future measures, were put into a "Tool Kit" for further qualitative evaluation.

Based on analysis by the model, conservation measures were grouped into alternative programs of increasingly higher water savings and implementation costs (Table ES-1). Conservation Program A consists of 10 measures that are part of the existing City water conservation program. Conservation Program B includes all of Program A, plus those additional measures that have an individual benefit-cost ratio of 0.9 or greater, for a total of 17 measures. Conservation Program C includes all measures evaluated, except for Measure 5 which is replaced with the enhanced Measure 6. The measures included in Conservation Programs A, B, and C are identified in Table ES-1 in the columns at the right. Figure ES-1 shows the projected demand without the effects of the plumbing code, with the plumbing code effects, and with the plumbing code and three conservation program alternates. Water savings were evaluated and benefit-cost ratios computed for 20–year period of 2011 to 2030, coinciding with the City's water supply planning period. Savings were then calculated to the year 2030 for each of these programs (see Table ES-2).

Table ES-3 shows the relative demand reductions in the year 2030, conservation program costs for the utility, present value economic information, and the utility cost of water saved for each of the alternate programs. Demand reduction by 2030 is measured from the 14,825 AFY projected 2030 demand without the effects of the plumbing code. Additional resources and customer contacts as embodied in the conservation programs identified in this memorandum, are required to reach higher levels of potential water savings. Utility costs include the cost to the City to run the program, including staff time, rebates, any contracted services, expense, etc. While utility cost is the primary consideration, this memorandum also considers customer costs and community costs to some extent, as described in the body of the memorandum. The plumbing code is included as passive baseline savings in addition to the long-term conservation program in Programs A-C. Most of the future program water savings consist of outdoor landscape improvements.

A Benefit-Cost ratio, which is the ratio of the present value of benefits to the present value of costs, is the most accurate indicator of cost-effectiveness. When the ratio of the Present Value of the benefits to the Present Value of the costs is greater than 1.0 for a particular program of measures, that program can be said to be cost-effective. Benefits for the utility can also be expressed as the value to the utility of the saved water. For the City, the value of the saved water is the cost savings from not producing the water that is saved. This could range from not treating pumped groundwater to not buying water from the State Water Project. An

assessment was made by the City and the value of the saved water was determined to be $600 per acre-foot. This value is hereafter referred to as the City's "Avoided Costs".

Program A reflects estimated water savings derived from the plumbing code and continuing the current program. The additional measures that create programs B and C produce increasing incremental water savings and costs. Figure ES-2 illustrates there are apparent diminishing returns when measures are added beyond Program B. Demand reductions for year 2030 range from 920 to 1,919 AF/Yr. As the plumbing code water savings do not cost the City any money, the graph starts at the plumbing code water savings in 2030.

Table ES-1
Conservation Measures Selected for Programs

No.	Measure Name (ND = Requirements for New Development)	Program A	Program B	Program C
1	Promote Water Efficiency in Green Buildings		✓	✓
2	ND Require High Efficiency Toilets		✓	✓
3	ND Require High Efficiency Faucets and Showerheads		✓	✓
4	Fixture Replacement SB 407		✓	✓
5	Financial Incentives for Irrigation and Landscape Upgrades (Current)	✓	✓	
6	Financial Incentives for Irrigation and Landscape Upgrades			✓
7	Washer Rebates	✓	✓	✓
8	Washer Rebates for High Efficiency Machines			✓
9	High Efficiency Toilet (HET) Rebates	✓	✓	✓
10	Single Family Water Check Up	✓	✓	✓
11	Multifamily Water Check Up	✓	✓	✓
12	Existing Commercial Washer Rebate	✓	✓	✓
13	Cisterns/Rain Catchments			✓
14	Gray water Retrofit SF			✓
15	Current High Efficiency Urinal Rebate (<0.25 gallon)	✓	✓	✓
16	ND Require 0.5 gal/flush or less urinals in new buildings		✓	✓
17	School Building Retrofit		✓	✓
18	Irrigation (Landscape) Water Budgets	✓	✓	✓
19	Irrigation Water Surveys	✓	✓	✓
20	Mulch Program			✓
21	CII Water Check Up Level 1	✓	✓	✓
22	CII Water Check Up Level 2		✓	✓
23	Customized CII Incentive Program			✓
	Total Measures in each Program	10	17	22

Figure ES-1

Long Term Demands with Conservation Programs
(Demand is measured by total water system production, including potable and recycled water)

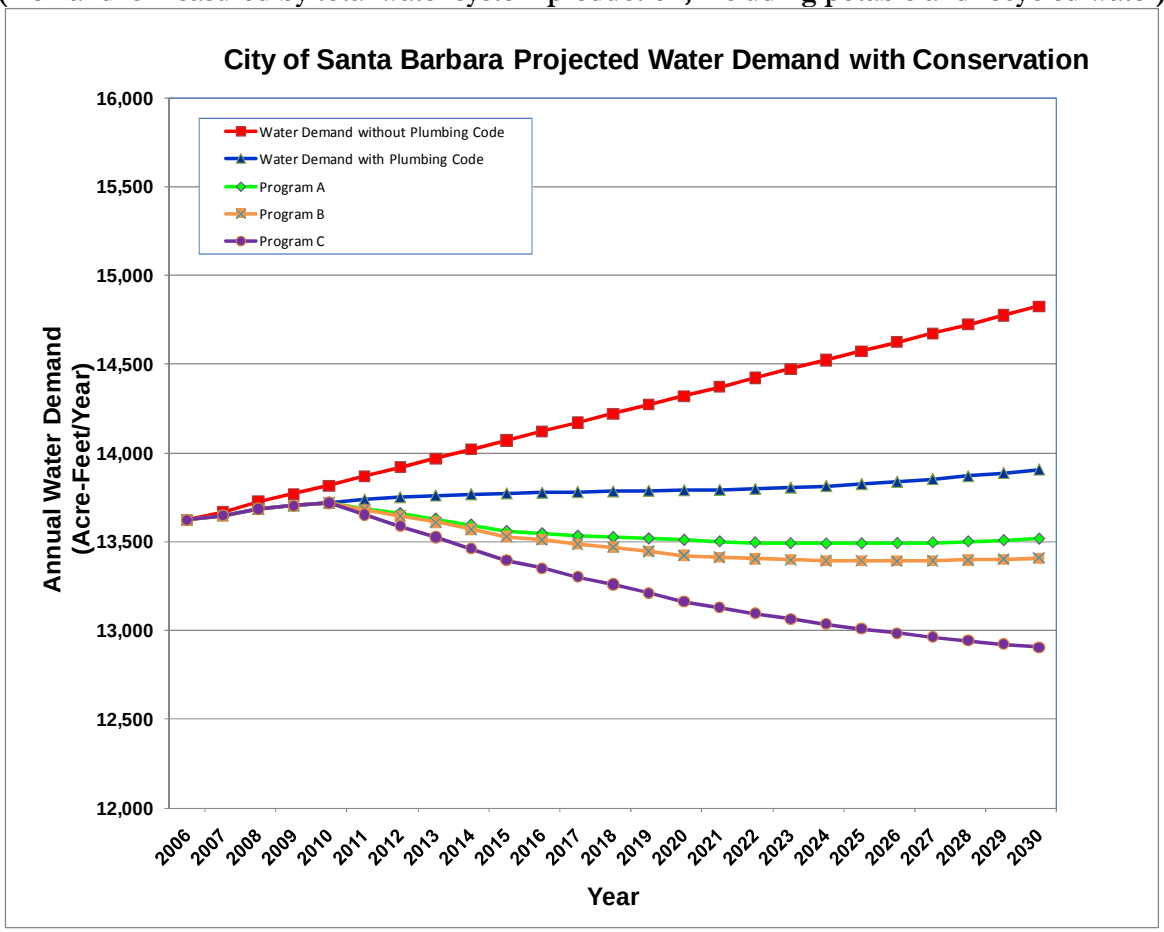


Table ES-2

Conservation Program Description and Future Water Savings

Conservation Program	Description	2030 Demand Reduction (AF/Yr)
-	No Conservation Programs, Plumbing Code Only	919
A	Continue Current Conservation Program (10 measures) and Plumbing Code	1,308
B	Add 7 Cost-Effective Measures to Current Program A and Plumbing Code	1,417
C	Add 5 More Measures to Program B and Plumbing Code	1,919

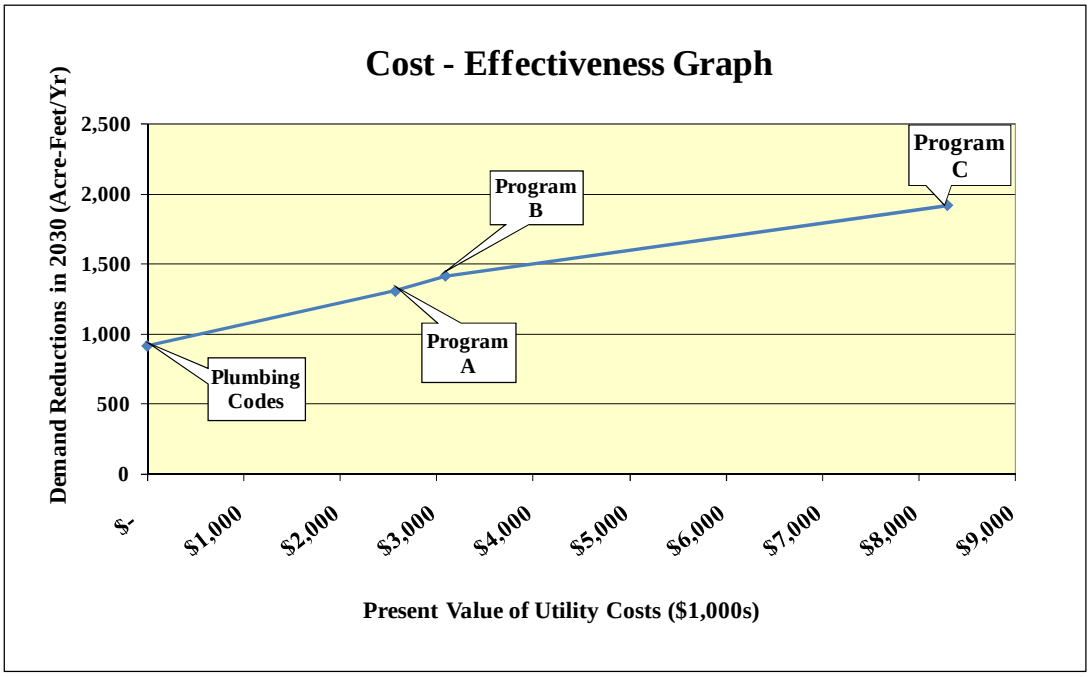
Table ES-3
Economic Summary of Long-Term Conservation Programs
(Excluding Tool Kit Measures)

Conservation Program	Demand Reduction by 2030 (AFY)	Total 20-Year Conservation Program Water Savings (AF)	Average Annual Program Cost to Utility ($)	Present Value of Utility Benefits ($)	Present Value of Utility Costs ($)	Utility Benefit - Cost Ratio	Utility Cost of Water Saved ($/AF)
Plumbing Code Only	919	11,085	NA	NA	NA	NA	NA
Program A + Plumbing Code	1,308	16,419	$194,000	$2,455,000	$2,570,000	0.96	$482
Program B + Plumbing Code	1,417	17,801	$233,200	$3,131,000	$3,089,000	1.01	$460
Program C + Plumbing Code	1,919	23,193	$629,400	$5,867,000	$8,287,000	0.71	$684

Notes:
1. The DSS model is a 30-year model. It was run for 2006 to 2036 to include the base year of 2006 and the 20-year conservation program period of 2011 to 2030.
2. Demand Reduction by 2030 is measured from the 14,825 AFY projected 2030 demand without the effects of the Plumbing Code.
3. Average Annual Program Cost excludes any potential costs for the 21 measures in the Tool Kit
4. Utility Cost of Water Saved somewhat undervalues the cost of savings because program costs are discounted to present value and the water benefit is not. Utility Benefit-Cost ratio is the most accurate measure of cost effectiveness, because it accounts for the time value of money.

Figure ES- 2

Present Value of Utility Costs versus Cumulative (Total) Water Saved



Appendix E:

City of Santa Barbara

Long-Term Water Supply

Performance Charts

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Water Supply Performance: Scenario A - Current Conditions

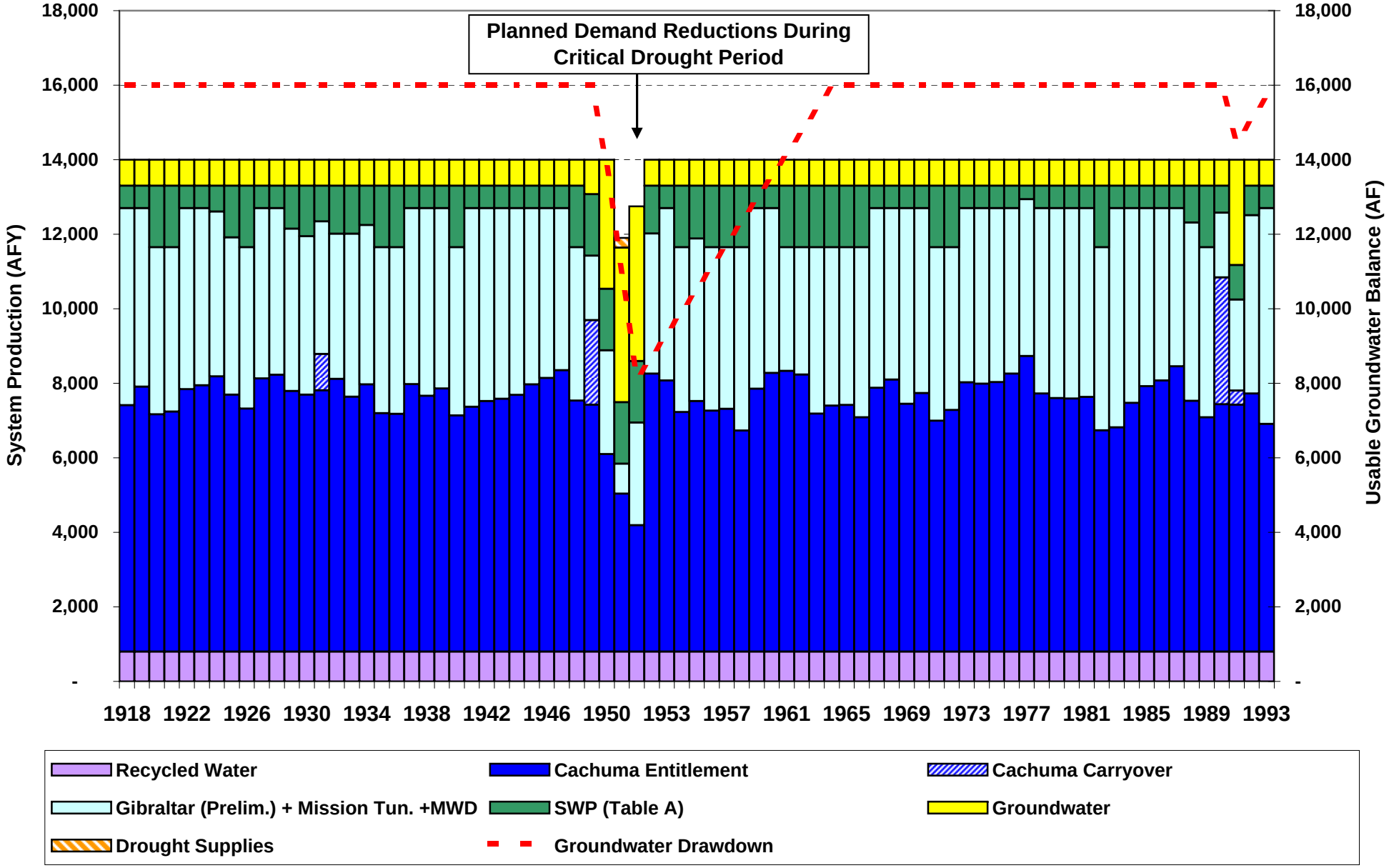
Projected System Demand (AFY): **14,000**

Cachuma Yield Assumption: **Current Entitlement**

Total Critical Period Drought Supplies Required (AF): **262**

Water Supply Target (including Safety Margin): **14,000**

Planned Demand Reductions:	Stage 1	Stage 2	Stage 3
	10%	**15%**	**15%**



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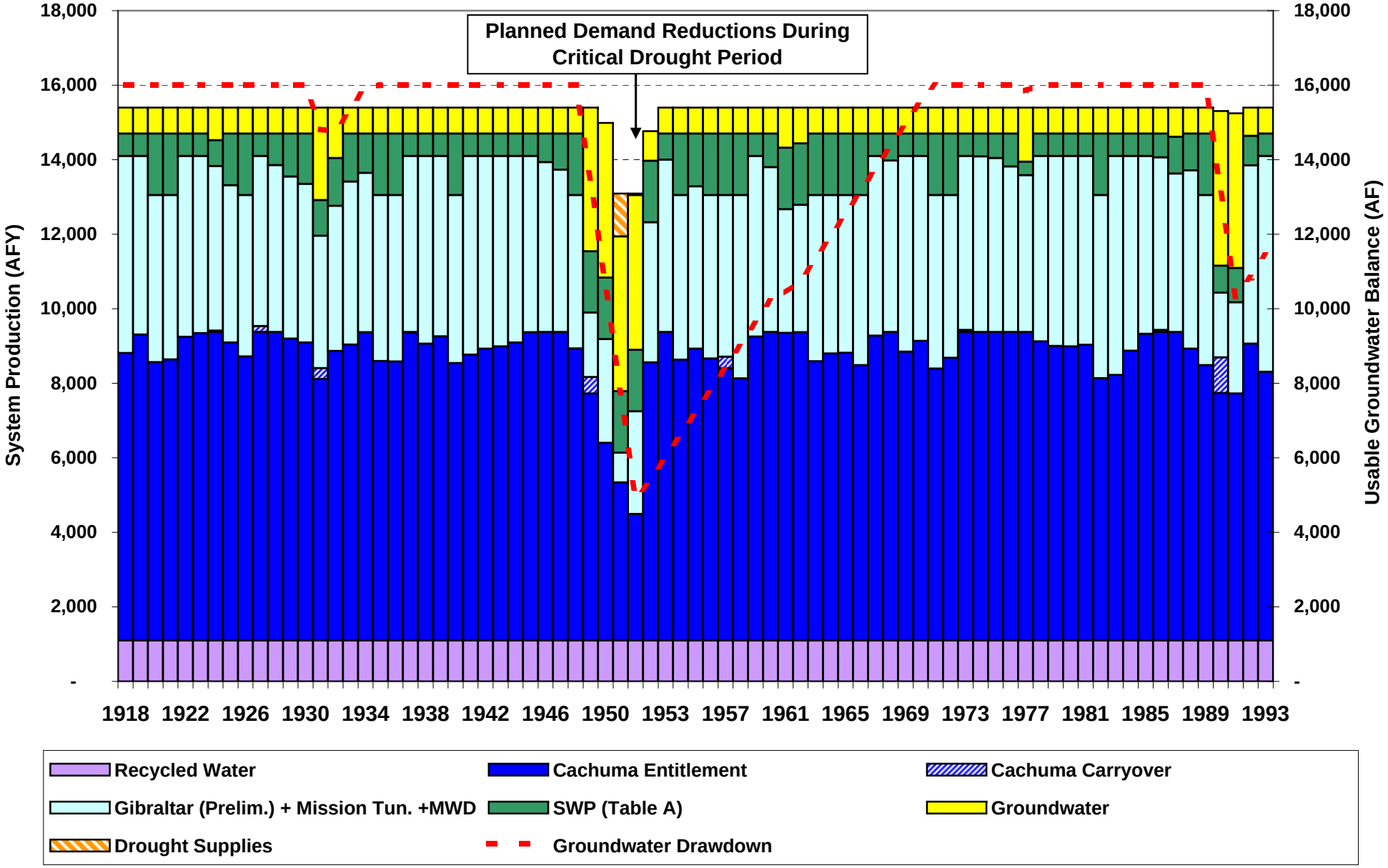
Water Supply Performance: Scenario B - Near Term

Projected System Demand (AFY):	**14,000**	Water Supply Target (including Safety Margin):	**15,400**		
Cachuma Yield Assumption:	**Current Entitlement**	Planned Demand Reductions:	Stage 1	Stage 2	Stage 3
Total Critical Period Drought Supplies Required (AF):	**1,195**		**10%**	**15%**	**15%**



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Water Supply Performance: Scenario C - 2030 Conditions

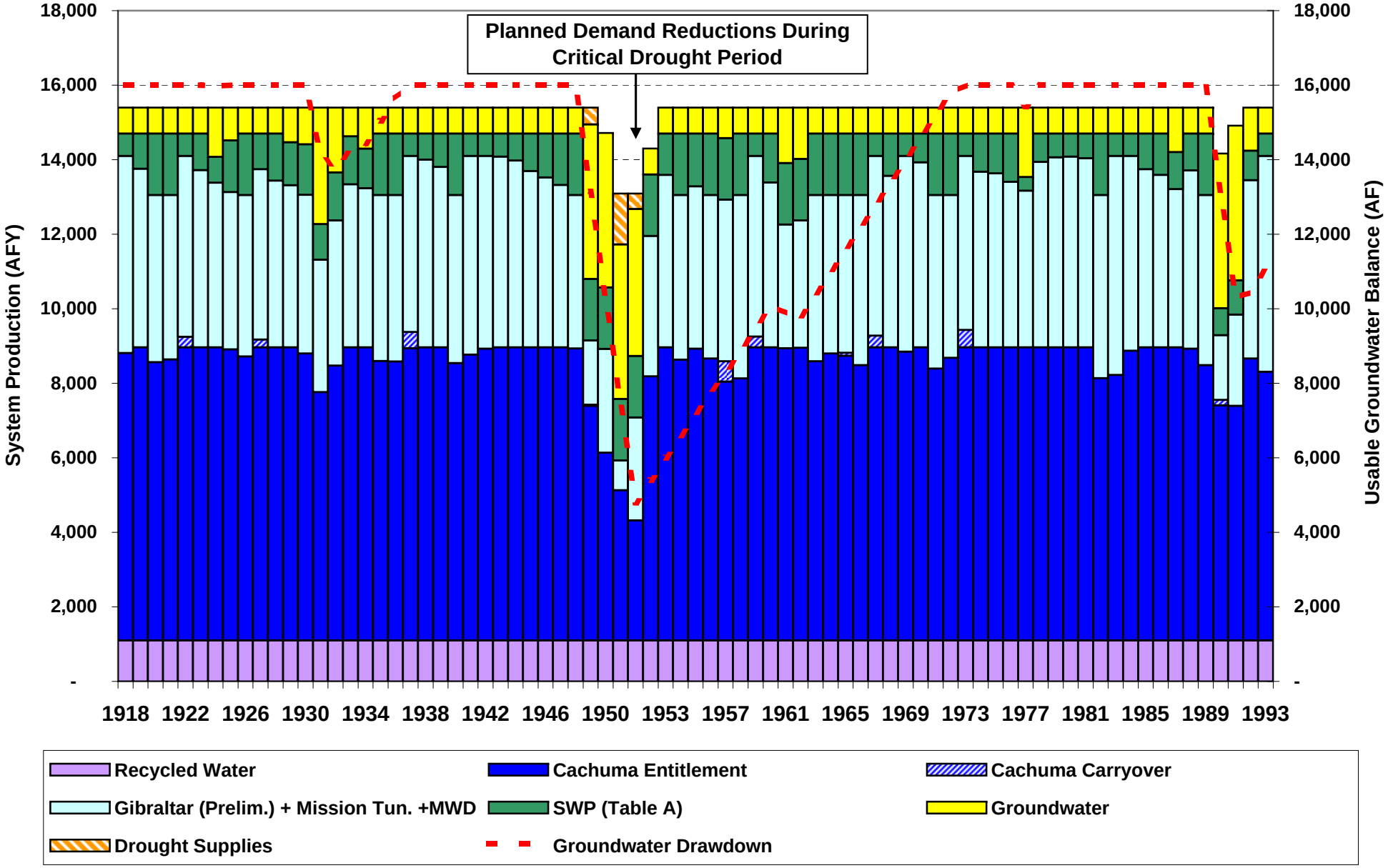
Projected System Demand (AFY): **14,000**

Water Supply Target (including Safety Margin): **15,400**

Cachuma Yield Assumption: **Projected Entitlement**

Planned Demand Reductions: Stage 1 **10%** Stage 2 **15%** Stage 3 **15%**

Total Critical Period Drought Supplies Required (AF): **2,228**



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Appendix F:

Excerpts from Santa Barbara Municipal Code, Chapter 14.20, Regarding Water Use Regulations During Drought Conditions

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Excerpts from Santa Barbara Municipal Code, Chapter 14.20, Regarding Water Use Regulations During Drought Conditions

14.20.215 Water Use Regulations During Drought Conditions.

A. STAGE TWO DROUGHT CONDITION. Upon adoption by the City Council of a resolution declaring a Stage Two Drought Condition and for as long as that condition exists, the following water use regulations, and such other regulations as may be adopted by resolution of the City Council, shall apply to all use of water, other than reclaimed wastewater, that is provided by the City water supply system.

1. The use of running water from a hose, pipe, or faucet for the purpose of cleaning buildings and paved, tile, wood, plastic or other surfaces shall be prohibited, except in the event the Director determines that such use is the only feasible means of correcting a potential threat to health and safety.
2. All restaurants that provide table service shall post, in a conspicuous place, a Notice of Drought Condition as approved by the Director and shall refrain from serving water except upon specific request by a customer.
3. The operation of and introduction of water into ornamental fountains and bodies of water shall be prohibited.
4. Operators of hotels, motels, and other commercial establishments offering lodgings shall post in each room a Notice of Drought Condition as approved by the Director.
5. Any use of water that causes runoff to occur beyond the immediate vicinity of use shall be prohibited.
6. The use of potable water for cleaning, irrigation and construction purposes, including but not limited to dust control, settling of backfill, flushing of plumbing lines, and washing of equipment, buildings and vehicles, shall be prohibited in all cases where the Director has determined that use of reclaimed wastewater is a feasible alternative.
7. Irrigation at any time from 8:00 a.m. to 6:00 p.m. of any yard, orchard, park, recreational area, or other area containing vegetation shall be prohibited.
8. Boats and vehicles shall be washed only at commercial car washing facilities equipped with water recycling equipment or by use of a bucket and hose equipped with a self-closing valve that requires operator pressure to activate the flow of water.

B. STAGE THREE DROUGHT CONDITION. Upon adoption by the City Council of a resolution declaring a Stage Three Drought Condition and for as long as that condition exists, the following water use regulations, and such other regulations as may be adopted by resolution of the City Council, shall apply to all use of water, other than reclaimed wastewater, that is provided by the City water supply system.

1. Each of the Stage Two water use regulations set forth in Subsections A.1 through A.6 of this Section shall be applicable.
2. The introduction of water into swimming pools and spas shall be prohibited.
3. The use of water through a meter that is restricted to irrigation uses shall be prohibited, and the City shall have the right to shut off water service to any such meter without notice to the account holder or any other person.
4. Irrigation of any yard, orchard, park, recreational area, or other area containing vegetation shall be prohibited, except by means of a hand-held bucket.
5. Boats and vehicles shall be washed only by use of a hand-held bucket or at commercial car washing facilities equipped with water recycling equipment.

C. EXEMPTIONS. Exemptions to the water use regulations set forth in this Section may be granted by the Director for specific uses of water, on the basis of hardship and in accordance with such guidelines for exemptions as the City Council may adopt. A denial of a request for an exemption may be appealed to a review committee consisting of the Director, the Parks Director or his designated representative, one member of the Board of Water Commissioners appointed by the Board, and such other persons, if any, as the City Council may appoint. The decision of the review committee shall be final.

D. Upon the declaration of and during a Stage Three Drought Condition, the failure of a mobilehome park owner to introduce water into a swimming pool or spa located in a mobilehome park, in accordance with the requirement of Paragraph B.7 of this Section, shall not be considered an increase in "rent" for purposes of Municipal Code Section 26.08.030.N. (Ord. 4558, 1989.)

14.20.225 Violations.

A. Any failure to comply with a provision of this Chapter shall constitute a violation, regardless of whether the failure to comply is caused by an account holder, a consumer or any other person or entity.

B. Where the failure to comply is continuing and intentional, each successive hour of such failure to comply shall be a separate and distinct violation. (Ord. 4558, 1989.)

14.20.226 Penalties and Charges.

A. The following penalties shall apply to any violation of any provision of this Chapter:

1. For the first violation within the preceding twelve (12) calendar months, the Director shall issue a written notice of the fact of such violation.

2. For a second violation within the preceding twelve (12) calendar months, the Director shall impose a surcharge against the account holder for the property where the violation occurred or is occurring, in an amount not to exceed two-hundred and fifty dollars ($250.00).

3. For a third violation within the preceding twelve (12) calendar months, the Director:

a. Shall impose a surcharge against the account holder for the property where the violation occurred or is occurring, in an amount not to exceed two-hundred and fifty dollars ($250.00); and

b. May install a flow restricter on the service where the violation occurred or is occurring, for a period to be determined by the Director.

4. For a fourth and any subsequent violation within the preceding twelve (12) calendar months, the Director:

a. Shall impose a surcharge against the account holder for the property where the violation occurred or is occurring, in an amount not to exceed two-hundred and fifty dollars ($250.00); and

b. May install a flow restricter on or shut off water service to the property where the violation occurred or is occurring, for a period to be determined by the Director.

B. If a flow restricter is installed or water service shut off pursuant to Subsection A of this Section, prior to restoration of normal water service the account holder whose service is affected shall be required to reimburse the City for whatever cost it has incurred and will incur in installing and removing a flow restricter and in shutting off and turning on water service.

C. Any surcharge imposed pursuant to this Section shall be added to the account of the account holder for the property where the violation occurred or is occurring and shall be due and payable on the same terms and subject to the same conditions as any other charge for regular water service. The maximum amount of surcharges which an account holder may be required to pay during any twelve-month period shall be one thousand dollars ($1,000.00).

D. Nothing in this Chapter shall limit or be construed to limit the right of an account holder to seek reimbursement of a surcharge from a tenant or other consumer. (Ord. 4558, 1989.)

14.20.227 Notice of Violation - Hearing.

A. For each violation of this Chapter, the Director shall give notice as follows:

1. By sending written notice through the U.S. mail to the account holder for the property where the violation occurred or is occurring, at the current billing address shown in the City's water billing records; and

2. By personally giving written notice thereof to the person who committed the violation or by leaving written notice with some person of suitable age and discretion at the property where the violation occurred or is occurring; or

3. If neither the person who committed the violation nor a person of suitable age and discretion can be found, then by affixing written notice in a conspicuous place on the property where the violation occurred or is occurring.

B. Any written notice given under this Section shall contain a statement of:

1. The time, place and nature of the violation;

2. The person(s) committing the violation, if known;

3. The provision(s) of this Chapter violated;

4. The possible penalties for each violation;

5. The account holder's right to request a hearing on the violation and the time within which such a request must be made; and

6. The account holder's loss of the right to a hearing in the event the account holder fails to request a hearing within the time required.

C. Any account holder provided a notice of violation in accordance with the provisions of this Chapter shall have the right to request a hearing. The request must be made in writing and must be received by the Director within ten (10) calendar days of the date of the notice of violation. The Director shall conduct the hearing, at which both written and oral evidence may be presented, and shall decide whether a violation occurred and the appropriate penalty. In determining the appropriate penalty, the Director shall consider whether the account holder knew of the violation at the time it occurred and whether he or she took reasonable action to correct the violation upon notification of it. In addition, the Director shall exercise his discretion in accordance with such guidelines as the City Council may adopt by resolution.

1. For a first or second violation within a twelve (12) month period, the decision of the Director shall be final.

2. For a third or subsequent violation within a twelve (12) month period, the account holder shall have the right to appeal the decision of the Director by requesting a hearing before the Board of Water Commissioners ("Board"). The request for hearing before the Board shall be in writing and shall be delivered to the Director not later than seven (7) calendar days after the date of the decision of the Director. At the hearing, the Board may receive and hear both written and oral evidence and shall have the authority to affirm, reverse, or modify the decision of the

Director. The decision of the Board shall be final.

D. If an account holder fails to request a hearing before the Director or the Board within the period(s) provided in this Section, the action of the Department shall be deemed final.

E. There shall be no installation of a flow restricter or shut off of water service until a notice of violation has become final or there is a final decision of the Director or the Board ordering installation of a flow restricter or shut-off of water service. (Ord. 4558, 1989.)

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Appendix G:

Water and Wastewater Service Rates

Fiscal Year 2011

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City of Santa Barbara - Public Works Department

Rates for City Water and Sewer Service

Resolution No. 10-044 (for Fiscal Year 2011)

1 hcf = 100 cubic feet = 748 gallons

Customer Class	Water Service Rates[1]	Sewer Service Rates
Single Family Residential	First 4 hcf @ $2.93 Next 16 hcf @ $4.90 All other @ $5.16	$12.51 per month; plus $2.17 per hcf, up to 10 hcf per month
Multi-Family Residential, 1-4 dwelling units	First 4 hcf per dwelling unit @ $2.93 Next 8 hcf per dwelling unit @ $4.90 All other @ $5.16	$12.51 per month per dwelling unit; plus $2.17 per hcf, up to 8 hcf per dwelling, per month
Multi-Family Residential, 5+ dwelling units	First 4 hcf per dwelling unit @ $2.93 Next 8 hcf per dwelling unit @ $4.90 All other @ $5.16	$12.51 per month per dwelling unit; plus $2.17 per hcf, up to 7 hcf per dwelling, per month
Commercial	100% of base allotment[2] @ $4.90 per hcf; All other @ $5.16	$2.46 per hcf; subject to minimum charge by meter size (see table below)
Industrial & High Strength Commercial	100% of base allotment[2] @ $4.90 per hcf; All other @ $5.16 per hcf	$2.98 per hcf; subject to minimum charge by meter size (see table below)
Irrigation - Residential	Billed as if used through associated residential meter, OR annual allotment[3] of 654 hcf/acre @ $4.90; all other @ $5.16	Not applicable
Irrigation - Recreation/Parks/ Schools	Annual allotment[3] of 1,404 hcf/acre @ $2.31 Next 240 hcf/acre/year @ $4.90 All other @ $5.16	Not applicable
Irrigation - Commercial	100% of base allotment[2] @ $4.90 per hcf; All other @ $5.16/hcf	Not applicable
Irrigation – Agriculture	Annual allotment[3] of 1080 hcf/acre @ $1.45 Next 240 hcf/acre/year @ $4.90 All other at $5.16/hcf	Not applicable
Recycled Water	All usage @ $1.85/hcf	Charges based on type of use. Not applicable for irrigation.
Outside City Limits	130% of corresponding in-City rates	Same as in-City rates, except that residential accounts not receiving City water are charged at maximum rate.

Monthly Water Meter Service Charges By Meter Size[1]

Meter Size	5/8"	3/4" *	1"	1½"	2"	3"	4"	6"	8"	10"
Monthly Service Charge:	$12.31	$18.50	$30.80	$61.58	$98.56	$197.10	$307.97	$615.94	$984.68	$1,416.66

Minimum Monthly Sewer Charges by Meter Size for Non-Residential Customers

Meter Size	5/8"	3/4" *	1"	1½"	2"	3"	4"	6"	8"	10"
Commercial	$23.51	$35.27	$41.03	$70.42	$117.41	$234.72	$292.96	$586.79	$1,026.91	$1,576.28
Indus/HS Com.	$29.31	$43.96	$51.37	$88.22	$146.71	$293.35	$366.81	$733.48	$1,283.55	$2,017.13

* This meter size no longer available for new installations.

Typical City Water and Sewer Fees for Connection of a Single-Family Residence

Water: $2,102 (1" service connection, with 5/8" meter) + $5,691 (buy-in fee, per residence) = $7,793

Sewer: $638 (4" sewer tap) + $313 (trench inspection) + $4,118 (buy-in fee, single-family residence)[4] = $5,069

For more information, contact the City's Water Hotline at (805) 564-5460

[1] Utility users tax of 6% added to metered water charges and monthly water meter service charges.

[2] Base allotment = average monthly consumption during most recent January - June period.

[3] Annualized allotments run July to June; new allotments available for the July water bill; unused allotments do not carry forward, except for agricultural irrigation customers.

Revised: July 7, 2010

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Appendix H:

California Urban Water Conservation Council

Best Management Practices Reports

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CUWCC BMP RETAIL COVERAGE REPORT 2009-2010

Foundation Best Management Practices for Urban Water Efficiency

Agency: City of Santa Barbara **District Name:** City of Santa Barbara, PWD **CUWCC Unit #:** 88
Retail

Primary Contact Alison Jordan **Telephone** 805 564-5574 **Email:** ajordan@SantaBarbaraCA.gov

Compliance Option Chosen By Reporting Agency: **Traditional**

Foundational BMPs

BMP 1.1 Operational Practices

		2009	2010	Conservation Coordinator provided with necessary resources to implement BMPs?
1.Conservation Coordinator provided with necessary resources to implement BMPs?	Name	Alison Jordan	Alison Jordan	
	Title	Water Conservation Coordinator	Water Conservation Coordinator	
	Email		ajordan@SantaB	
		On Track	On Track	

				On Track if any one of the 6 ordinance actions done, plus documentation or links provided
2. Water waste prevention documentation	Descriptive File	SBMC TITLE 14 Water and	SBMC TITLE 14 Water and Sewers, Waste of Water Enforcement Policy, Landscape Design Standards August 12, 2008, 2008 Adopting	
	Descriptive File 2010			
	URL	Waste of Water Enforcement Policy, per City Ordinance No.		
	URL 2010		0	
	Describe Ordinance Terms	Waste of Water Enforcement Policy, per City Ordinance No.		
	Describe Ordinance Terms 2010		Waste of Water Enforcement Policy, per City Ordinance No. 4558, adopted on February 1989, prohibits the waste of water defined as gutter	
		On Track	On Track	

Agency: City of Santa Barbara **District Name:** City of Santa Barbara, PWD **CUWCC Unit #:** 88
Retail

CUWCC BMP RETAIL COVERAGE REPORT 2009-2010

Foundation Best Management Practices for Urban Water Efficiency

BMP 1.2 Water Loss Control

	2009		
Complete a prescreening Audit	Yes	On Track	On Track if Yes
Metered Sales	2,536		
Verifiable Other Uses	34		
Total Supply	2,570		
(Metered Sales + System uses)/ Total Supply >0.89	1.00	On Track	On Track if =>.89, Not on Track if No
If ratio is less than 0.9, complete a full scale Audit in 2009?	N/A	On Track	On Track if Yes
Verify Data with Records on File?	Yes	On Track	On Track if Yes
Operate a system Leak Detection Program?	Yes	On Track	On Track if Yes

	2010		
Compile Standard Water Audit using AWWA Software?	Yes	On Track	On Track if Yes, Not on Track if No
AWWA file provided to CUWCC?	WaterAudit FY10_City of	On Track	On Track if Yes, Not on Track if No
AWWA Water Audit Validity Score?	55		Info only until 2012
Completed Training in AWWA Audit Method?	yes		Info only until 2012
Completed Training in Component Analysis Process?	Yes		
Complete Component Analysis?	No		Info only until 2012
Repaired all leaks and breaks to the extent cost effective?	Yes	On Track	On Track if Yes, Not on Track if No
Locate and repair unreported leaks to the extent cost effective.	Yes	On Track	On Track if Yes, Not on Track if No
Maintain a record-keeping system for the repair of reported leaks, including time of report, leak location, type of leaking pipe segment or fitting, and leak running time from report to repair.			Info only until 2012

Provided 7 types of Water Loss Control Info — Info only until 2012

Leaks Repaired	Value Real Losses	Value Apparent Losses	Miles Surveyed	Press Reduction	Cost of Interventions	Water Saved
0	$ -	$ -	0	Off	$ -	0

Agency: City of Santa Barbara **District Name:** City of Santa Barbara, PWD **CUWCC Unit #:** 88
Retail

CUWCC BMP RETAIL COVERAGE REPORT 2009-2010

Foundation Best Management Practices for Urban Water Efficiency

1.3 METERING WITH COMMODITY RATES FOR ALL NEW CONNECTIONS AND RETROFIT OF EXISTING CONNECTIONS

If signed MOU prior to 31 Dec 1997, On Track if all connections metered; If signed after 31 Dec 1997, complete meter installations by 1 July 2012 or within 6 yrs of signing and 20% biannual reduction of unmetered connections.

		2009		2010		
Exemption or 'At least as Effective As' accepted by CUWCC						
Numbered Unmetered Accounts	2008	0	On Track	0	On Track	On Track if no unmetered accounts
Metered Accounts billed by volume of use		Yes	On Track	Yes	On Track	Volumetric billing required for all connections on same schedule as metering
Number of CII accounts with Mixed Use meters		2,289		2,289		Info only
Conducted a feasibility study to assess merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters?		No	On Track	No	On Track	Required in 2011
Feasibility Study provided to CUWCC?		No	On Track	No	On Track	Required in 2011
Completed a written plan, policy or program to test, repair and replace meters		Yes	On Track	Yes	On Track	On Track if Yes, Not on Track if No

CUWCC BMP RETAIL COVERAGE REPORT 2009-2010

Foundation Best Management Practices for Urban Water Efficiency

Agency: City of Santa Barbara **District Name:** City of Santa Barbara, PWD **CUWCC Unit #:** 88

Retail

Coverage Report Date: June 26, 2011

Primary Contact Alison Jordan **Email:** ajordan@santabarbaraca.gov

1.4 Retail Conservation Pricing

Metered Water Rate Structure

Date 2009 data received May 26, 2011

Date 2010 data received May 26, 2011

On Track if: Increasing Block, Uniform, Allocation, Standby Service; Not on Track if otherwise

Customer Class	2009 Rate Type	Conserving Rate?	Customer Class	2010 Rate Type	Conserving Rate?
Single-Family	Increasing Block	Yes	Single-Family	Increasing Block	Yes
Multi-Family	Increasing Block	Yes	Multi-Family	Increasing Block	Yes
Commercial	Increasing Block	Yes	Commercial	Increasing Block	Yes
Industrial	Increasing Block	Yes	Industrial	Increasing Block	Yes
Dedicated Irrigation	Allocation Based	Yes	Dedicated Irrigation	Allocation	Yes
	On Track			On Track	

Year Volumetric Rates began for Agencies with some Unmetered Accounts

Info only

Agencies with Partially Metered Service Areas: If signed MOU prior to 31 Dec. 1997, implementation starts no later than 1July 2010. If signed MOU after 31 Dec. 1997, implementation starts no later than 1July 2013, or within seven years of signing the MOU,

Agency: City of Santa Barbara
Retail

District Name: City of Santa Barbara, PWD

CUWCC Unit #: 88

Coverage Report Date: June 26, 2011

CUWCC BMP RETAIL COVERAGE REPORT 2009-2010

Foundation Best Management Practices for Urban Water Efficiency

Adequacy of Volumetric Rates) for Agencies with No Unmetered Accounts

Customer Class	2009 Rate Type	2009 Volumetric Revenues $1000s	2010 Rate Type	2010 Volumetric Revenues $1000s
Single-Family	Increasing Block	$ 10,370	Single-Family	$ 10,691
Multi-Family	Increasing Block	$ 5,355	Multi-Family	$ 4,476
Commercial	Increasing Block	$ 5,148	Commercial	$ 4,581
Industrial	Increasing Block	$ 838	Industrial	$ 250
Dedicated Irrigation	Allocation Based	$ 925	Dedicated Irrigation	$ 1,041
Other		$ 641		$ 552
Other		$ -		$ -
Total Revenue Commodity Charges (V):		$ 23,277		$ 21,591
Total Revenue Fixed Charges (M):		$ 6,013		$ 6,264
Calculate: V / (V + M):		79%		78%
		On Track		On Track

Agency Choices for rates:

A) Agencies signing MOU prior to 13 June2007, implementation starts 1 July2007: On Track if (V / (V + M) ≥ 70% x .8 = **56% for 2009** and 70%x0.90 = **63% for 2010**; Not on track if (V / (V + M)) < 70%;

B) Use Canadian model. Agencies signing MOU after 13June2007, implementation starts July 1 of year following signing.

Canadian Water & Wastewater Rate Design Model Used and Provided to CUWCC	No	No
If Canadian Model is used, was 1 year or 3 year period applied?		

Wastewater Rates

	2009	If 'No', then wastewater rate info not required.	2010
Does Agency Provide Sewer Service?	Yes		Yes

Customer Class	2009 Rate Type	Conserving Rate?	Customer Class	2010 Rate Type	Conserving Rate?
Single-Family	Allocation Based	Yes	Single-Family	Allocation Based	Yes
Multi-Family	Allocation Based	Yes	Multi-Family	Allocation Based	Yes
Commercial	Uniform	Yes	Commercial	Uniform	Yes
Industrial	Uniform	Yes	Industrial	Uniform	Yes
	Select a Rate Structure			Select a Rate Structure	
	Select a Rate Structure			Select a Rate Structure	
	Select a Rate Structure			Select a Rate Structure	
	On Track			On Track	

On Track if: 'Increasing Block', 'Uniform', 'based on long term marginal cost' or 'next unit of capacity'

CUWCC BMP RETAIL COVERAGE REPORT 2009-2010

Foundation Best Management Practices for Urban Water Efficiency

BMP 2. EDUCATION PROGRAMS

BMP 2.1 Public Outreach Actions Implemented and Reported to CUWCC

	2009	2010
1) Contacts with the public (minimum = 4 times per year)	6	6
2) Water supplier contacts with media (minimum = 4 times per year, i.e., at least quarterly).	7	11
3) An actively maintained website that is updated regularly (minimum = 4 times per year, i.e., at least quarterly).	Yes	Yes
4) Description of materials used to meet minimum requirement.	Newsletter articles on conservation Flyers and/or brochures, bill stuffers, messages Landscape water conservation media campaigns General water conservation information Website News releases Newspaper contacts Radio contacts	Newsletter articles on conservation Flyers and/or brochures, bill stuffers, messages Landscape water conservation media campaigns General water conservation information Articles or stories resulting from outreach News releases Newspaper contacts Radio contacts
5) Annual budget for public outreach program.	$ 88,551	$ 118,219
6) Description of all other outreach programs	Description is too large for text area. Data will be stored in the BMP Reporting database when online.	Description is too large for text area. Data will be stored in the BMP Reporting database when online.
	On Track for 6 Actions	**On Track for 6 Actions**

All 6 action types implemented and reported to CUWCC to be 'On Track')

CUWCC BMP RETAIL COVERAGE REPORT 2009-2010

Foundation Best Management Practices for Urban Water Efficiency

2.2 School Education Programs Implemented and Reported to CUWCC

	2009	2010	
Does a wholesale agency implement School Education Programs for this unility's benefit?	Yes	Yes	
Name of Wholesale Supplier?	Santa Barbara County Water Agency	Santa Barbara County Water Agency	
1) Curriculum materials developed and/or provided by agency	The materials we distribute include water conservation coloring books, posters, and worksheets as well as water resources and water conservation information on our website.	The materials we distribute include water conservation bookmarks, coloring books, posters, and worksheets as well as water resources and water conservation information on our website.	Yes/ No
2) Materials meet state education framework requirements and are grade-level appropriate?	Yes	Yes	All 5 actions types implemented and reported to CUWCC to be 'On Track'
3) Materials Distributed to K-6?	Yes	Yes	
Describe K-6 Materials	The City of Santa Barbara provides water conservation coloring books, pencils, posters, stickers, and worksheets to K-6 students	The City of Santa Barbara provides water conservation bookmarks, coloring books, pencils, posters, stickers, and worksheets to K-6 students	Describe materials to meet minimum requirements
Materials distributed to 7-12 students?	Yes	Yes	Info Only
4) Annual budget for school education program.	$ 4,000	$ 4,000	
5) Description of all other water supplier education programs	The City provides water education presentations and materials to local schools and summer camps. Tours of the City's water treatment facilities with free bus transportation are provided. The City participates in the annual Water Awareness High School Vide	The City provides water education presentations and materials to local schools and summer camps. Tours of the City's water treatment facilities with free bus transportation are provided. The City participates in the annual Water Awareness High School Vide	
	See Wholesale Report	**See Wholesale Report**	
	0	0	
	On Track	**On Track**	

CUWCC BMP COVERAGE REPORT BMP 3 RESIDENTIAL

Agency: City of Santa Barbara **District Name:** City of Santa Barbara, PWD **CUWCC Unit #:** 88

Date: April 18, 2011

Primary Contact Alison Jordan **Email** ajordan@SantaBarbaraCA.gov

Compliance Option Chosen By Reporting Agency: Traditional **Initial 10 year period completed:** Y **If "Yes"credit for past BMP Implementation?** Y

Historic Re 1965

Completed Accounts SF Surveys: 3145 **MF Surveys:** 1852

15% of Accounts **SF** 2531 **MF** 910

Date 2009 Data Downloaded from PDF June 1, 2011

Date 2019 Data Downloaded from PDF June 1, 2011

BMP 3 C 1) Residential Assistance

	2009 Single Family Accounts	2009 SF Target	2009 Multi Family Units	2009 MF Targets	2010 Single Family Accounts	2010 SF Target	2010 Multi Family Units	2010 MF Targets
Total Number of Customers	16,873		6,069		16,920		6126	
Total Participants during Reporting Period	333		79		365		95	
Number of Leak Detection Surveys or Assistance on Customer Property	200	127	79	46	202	127	95	46
Number of Faucet Aerators Distributed	0		0		200		45	
Number of WSS Showerheads Distributed	1		10		0		4	
		On Track		On Track		On Track		On Track

"On Track" if annual number of surveys/assistance >= 1.5% of SF accounts and MF units; or >0.75% if historical credit is

Agency: City of Santa Barbara **District Name:** City of Santa Barbara, PWD **CUWCC Unit #:** 88

BMP 3 C2) Landscape Water Surveys	2009		2010		
	SF		SF		
Number of SF account landscape water surveys completed	133	127	163	127	
Surveys as Percent of SF Accounts	0.79%		0.96%		
	On Track		On Track		

greater than 15%

"On Track" if annual number of landscape surveys >= 1.5% of SF accounts

BMP 3 C3) High Efficiency Clothes Washers	2009		2010	
Number Financial Incentives Provided to Customers	182	152	101	169
Percent	1.69%		0.60%	
	On Track		On Track	

Historic HECW Program? Y

Credit for Historic HECW 103

Credit =124 x 5/6

"On Track" if number of incentives for HECW (WF,=5.0) => 0.9% SF accounts in 2009 and 1.0 % in 2010

Credit = Total number of HECW

BMP 3 C4) Water Sense Specification Toilets	2009		2010	
Retrofit 'On Resale' Ordinance exists	No		No	
75% Market Penetration Achieved				
If 'Yes' is documentation provided?	Yes	On Track	Yes	On Track

Ordinance must require replacement of toilets => 3.5 gpf when property is sold
On Track if ordinance exists

On Track if 75% penetration achieved and documentation provided

	SF	MF Units	SF	MF Units
Five year average Resale Rate	4%	9%	4%	9%
Number Toilets per Household	2	1	2	1
Number WSS Toilets Installed	22	10	17	4
Ave Resale Rate X Toilets /residence	675	273	677	276

On Track If number of toilets installed => average resale rate X number toilets per residence (from Base Year Data)

Agency: City of Santa Barbara | **District Name:** City of Santa Barbara, PWD | **CUWCC Unit #:** 88

BMP 3 C5) WSS for New Residential Development

	2009 SF	2009 MF	2010 SF	2010 MF	
Does an Ordinance Exists Requiring WSS Fixtures and Appliances in new SF and MF	No	No	No	No	On Track if ordinance exists requiring WSS in new residential units and documentation is provided
If 'Yes' is documentation provided?					
Incentives					
Number of new SF & MF units built	3	59	5	241	If no ordinance, to be On Track, provide incentives and describe, Including:

2009 New Residential Development Incentives and Results

Types of Incentives	Incentive Value SF	Number WSS Fixtures Installed	Number SF Participants	Number MF Participants	Measured SF Water Savings AF	Measured MF Water Savings AF
Built Green Fast	$ 100	14	3	8		

On Track

List Incentive Types, $ amounts, number of WSS fixtures installed; and number of participating SF & MF homes

2010 New Residential Development Incentives and Results

Types of Incentives	Incentive Value SF	Number WSS Fixtures Installed	Number SF Participants	Number MF Participants	Measured SF Water Savings AF	Measured MF Water Savings AF
Built Green Fast	$ 100	9	3	3		

CUWCC BMP COVERAGE REPORT

Traditional BMP 4 - Comercial Industrial Institutional

Agency: City of Santa Barbara
District Name: City of Santa Barbara
CUWCC Unit #: 88
Primary Contact Alison Jordan
Email: ajordan@santabarbaraca.gov
Report Date: June 30, 2011
Compliance Option Chosen By Reporting Agency: Traditional
Date Agency Signed MOU: 1/28/1992
Initial 10 year period completed: Y
If "Yes" , 50% credit for past BMP 9 Implementation? Y
Water Savings Credit (AF) 8.8

CII Baseline Water Use (AF): 2,550.0
Target CII Water Use Reduction (AF) 255.0
2 year Target (AF) 12.8

Target Reduction is 10% of Baseline CII water use over 10 years.

Water Efficiency Measures	2009 Quantity Installed	2009 Water Savings AF	2010 Quantity Installed	2010 Water Savings AF	Type of Program	Other type of Program
1 High Efficiency Toilets (1.2 GPF or less)	72	3.0	1	0.0	Incentive	
2 High Efficiency Urinals (0.5 GPF or less)	6	0.4	0	0.0	Incentive	
3 Ultra Low Flow Urinals	6	0.5	0	0.0	Incentive	
4 Zero Consumption Urinals	6	0.6	0	0.0	Incentive	
5 Commercial High Efficiency Single Load Clothes Washers	2	0.2	0	0.0	Incentive	
6 Cooling Tower Conductivity Controllers	0	0.0	0	0.0		
7 Cooling Tower pH Controllers	0	0.0	0	0.0		
8 Connectionless Food Steamers	0	0.0	0	0.0		
9 Medical Equipment Steam Sterilizers	0	0.0	0	0.0		
10 Water Efficient Ice Machines	0	0.0	0	0.0		
11 Pressurized Water Brooms	8	1.2	0	0.0	Incentive	
12 Dry Vacuum Pumps	0	0.0	0	0.0		
Total Water Savings		5.9		0.0		**On Track**

Guideline: 'On Track' if estimated savings as percent of baseline:
0.5% by the end of first reporting perio
2.4% by end of yr 4,
6.4% by end of year 8
9 % by end of yr 10

CII List of Efficiency Measures from MOU Compliance Policies Tier 3, page 5, dated 10-06-09

CUWCC BMP COVERAGE REPORT

Traditional BMP 5 - Landscape

Agency: City of Santa Barbara
District Name: City of Santa Barbara
CUWCC Unit #: 88
Primary Contact Alison Jordan
Email: ajordan@santabarbara.gov
Report Date: June 30, 2011
Compliance Option Chosen By Reporting Agency: Traditional
Date Agency Signed MOU: 1/28/1992
Initial 10 year period completed: Y
If "Yes" , 50% credit for past BMP 9 Implementation? Y
50% of Completed Accounts: 30

Required Documentation

	2009	2010
Number of dedicated irrigation meter accounts	729	712
Number of dedicated irrigation meter accounts with water budgets.	729	712
Percent of dedicated irrigation meters with water budgets	100.0%	100.0%
Target Rate for Year 1	9%	Target Rate for Year 2 18% **On Track**
Aggregate water use for dedicated non-recreational landscape accounts with budgets	**443.71**	**379.47**

ETo-based water use budgets developed for 90% of CII accounts with dedicated irrigation meters at an average rate of 9% per year over 10 years

Aggregate acreage assigned water budgets and average ET for dedicated non-recreational landscape accounts with budgets.

2009 Acres	2009 Average ET	2010 Acres	2010 Average ET
672.31		656.2	

Offer site-specific technical assistance annually to all accounts that are 20% over budget within six years of the date implementation was to commence.

2009 Accounts ≥20% over-budget			2010 Accounts ≥20% over-budget		
Number of Accounts	Offered Technical Assistance	Accepting Technical Assistance	Number of Accounts	Offered Technical Assistance	Accepting Technical Assistance
85			61	20	5

Aggregate acreage of recreational areas assigned water budgets and average ET for dedicated recreational landscape accounts with budgets.

2009 Acres	2009 Average ET	2010 Acres	2010 Average ET

Agency: City of Santa Barbara **District Name:** City of Santa Barbara **CUWCC Unit #:** 88

CII Accounts without Meters or with Mixed-Use Meters

	2009	2010
Number of mixed use and un-metered accounts.	2289	2289

Incentive Type	2009 Incentives and Responses: Incentive Value $	2009: Number offered to Customers	2009: Number accepted by Customers	2010 Incentives and Responses: Incentive Value $	2010: Number offered to Customers	2010: Number accepted by Customers	
Smart Irrigation controllers	4653		12	22168		45	Agency will implement and maintain a customer incentive program(s) for irrigation equipment retrofits.

	2009 Surveys: Number offered.	2009 Surveys: Number accepted	2010 Surveys: Number offered.	2010 Surveys: Number accepted
Landscape Irrigation Surveys	150	17	200	29
Agregate acreage for Mixed Use and un-metered accounts				

Complete irrigation water use surveys for not less than 15% of CII accounts with mixed-use meters and un-metered accounts within 10 years of the date implementation is to commence. (Note: CII surveys that include both indoor and outdoor components can be credited against coverage requirements for both the Landscape and CII BMPs.)

Percent Surveys Complete: 3.3%

On Track

On Track if the percent of CII accounts with mixed-use meters receiving a landscape water use survey equals or exceeds the following: 1.5% by the end of the first reporting period (year two) following the date implementation is to commence; 3.6% by the end of year four; 6.3% by the end of year six; 9.6% by the end of

	2009 Savings AF	2010 Savings AF
Estimated annual water savings by customers receiving surveys and implementing recommendations.	5483	

No Methodology Spreadsheet was uploaded

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The fields in red are required.

Agency name: City of Santa Barbara

Reporting unit name (District name): City of Santa Barbara, PWD

Reporting unit number: 88

Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@santabarbaraca.gov

You must enter the reporting unit number that we have on record for your agency. Click here to open a table to obtain this number.

Base Year Data

Link to FAQs

Reporting Unit Base Year

What is your reporting period? Fiscal

Base Year 2008

BMP 1.3 Metering

Number of unmetered accounts in Base Year 0

BMP 3.1 & BMP 3.2 & BMP 3.3 Residential Programs

Number of Single Family Customers in Base Year 43,760

Number of Multi Family Units in Base Year 20,805

BMP 3.4 WaterSense Specification (WSS) Toilets

Number of Single Family Housing Units constructed prior to 1992

Number of Multi Family Units prior to 1992

Average number of toilets per single family household 2.2

Average number of toilets per multi family household 1.2

Five year average resale rate of single family households 5%

Five-year average resale rate of multi family households 5%

Average number of persons per single family household 2.59

Average number of persons per multi family household 6.8

BMP 4.0 & BMP 5.0 CII & Landscape

Total water use (in Acre Feet) by CII accounts 2550

Number of accounts with dedicated irrigation meters 759

Number of CII accounts without meters or with Mixed Use Meters 2,289

Number of CII accounts 2,517

Comments:

version 1.0

The fields in red are required.

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Primary contact:

First name: Alison

Last name: Jordan

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Water Uses 2009

Potable Water Billed

Make sure to enter numbers in AF/Year.

Customer Type	Meter Accounts	Metered Water Delivered	Un-metered Accounts	Un-metered Water Delivered	Description
Single-Family	16,873.00	6,260.00			
Multi-Family	6,069.00	3,033.00			
Commercial	2,462.00	2,160.00			
Industrial	55.00	283.00			
Dedicated Irrigation	759.00	778.00			
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					

Potable Water Un-Billed

Customer Type	Meter Accounts	Metered Water Delivered	Un-metered Accounts	Un-metered Water Delivered	Description
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					

The fields in red are required.

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Reporting unit number: 88

Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@santabarbaraca.gov

Water Uses

2009

Non-Potable Billed

Customer Type	Meter Accounts	Metered Water Delivered	Un-metered Accounts	Un-metered Water Delivered	Description
Dedicated Irrigation	79.00	728.00			
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					

Non-Potable Un-Billed

Customer Type	Meter Accounts	Metered Water Delivered	Un-metered Accounts	Un-metered Water Delivered	Description
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					

The fields in red are required.

Agency name: City of Santa Barbara

Division name (Reporting unit): City of Santa Barbara, PWD

Reporting unit number: 88

Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@santabarbaraca.gov

WATER SOURCES

2009

Service Area Population: 93017

Potable Water

Own Supply Source Name	AF/YEAR	Water Supply Type	Water Supply Description
Cachuma Lake	8,236.00	Surface	
Gibraltar Reservoir	2,569.00	Surface	
Mission Tunnel	1,142.00	Groundwater	
Devil's Canyon	76.00	Surface	
Groundwater	1,112.00	Groundwater	
Desalination	0.00	Other	Ocean
		Other	
		Other	
		Other	
		Other	
		Other	

Imported Supply Source Name	AF/YEAR	Water Supply Type	Water Supply Description
State Water Project (SWP)	496.00	Surface	
SWP for LCMWC Conveyance	902.00	Surface	
Net imports from GWD	225.00	Surface	Water owed by the City by Goleta Wa
		Other	
		Other	
		Other	
		Other	
		Other	
		Other	
		Other	
		Other	

Exported Water Name	AF/YEAR	Where Exported?
Conveyance to LCMWC	902.00	State Water conveyed via City distribution system to La Cumbre Mu
Groundwater Injection	141.00	City groundwater basins for long-term storage

The fields in red are required.

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Reporting unit number: 88

Primary contact:

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Last name: Jordan

Email: ajordan@santabarbaraca.gov

2009

Service Area Population: 93017

Non- Potable Water

If you select Other for type, enter

Own Supply Source Name	AF/YEAR	Water Supply Type	Water Supply Description
El Estero WWTP	729.00	Recycled Non Potable	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	

Imported Supply Source Name	AF/YEAR	Water Supply Type	Water Supply Description
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	

Exported Water Name	AF/YEAR	Where Exported? such as groundwater recharge, retail,

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Primary contact:

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Last name: Jordan

Email: ajordan@santabarbaraca.gov

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Link to FAQs

2009

BMP 1.1 Operations Practices

Comments:

See the complete MOU: View MOU

See the coverage requirements for this BMP:

Conservation Coordinator

Conservation Coordinator ◯ Yes ◯ No

Contact Information

First Name	Alison
Last Name	Jordan
Title	Water Conservation Coordinator
Phone	805 564-5574
Email	ajordan@SantaBarbaraCA.gov

Note that the contact information may be the same as the primary contact information at the top of the page. If this is your case, excuse the inconvenience but please enter the information again.

Water Waste Prevention

Water Agency shall do one or more of the following:

a. Enact and enforce an ordinance or establish terms of service that prohibit water waste
b. Enact and enforce an ordinance or establish terms of service for water efficient design in new development
c. Support legislation or regulations that prohibit water waste
d. Enact an ordinance or establish terms of service to facilitate implementation of water shortage response measures
e. Support local ordinances that prohibit water waste
f. Support local ordinances that establish permits requirements for water efficient design in new

To document this BMP, provide the following:

a. A description of, or electronic link to, any ordinances or terms of service
b. A description of, or electronic link to, any ordinances or requirements adopted by local jurisdictions or regulatory agencies with the water agency's service area.
c. A description of any water agency efforts to cooperate with other entities in the adoption or enforcement of local requirement
d. description of agency support positions with respect to adoption of legislation or regulations

You can show your documentation by providing files, links (web addresses), and/or entering a description.

File name(s): Email files to natalie@cuwcc.org SBMC TITLE 14 Water and Sewers,Waste of Water Enforcement Policy, Landscape Design Standards Au

Web address(s) URL: comma-separated list

Enter a description:

Waste of Water Enforcement Policy, per City Ordinance No. 4558, adopted on February 1989, prohibits the waste of water defined as gutter flooding and failure to repair leaks in a timely manner.
On August 12, 2008, the City Council adopted the revised Landscape Design Standards for Water Conservation, Resolution No. 08-083. The Landscape Design Standards were originally adopted by

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Link to FAQs

View MOU

2009 BMP 1.2 Water Loss Control

Did your agency complete a pre-screening system audit in 2009? Yes ○ No ◉

If yes, answer the following:

Determine metered sales in AF:

Definition: other accountable uses not included in metered sales, such as unbilled water use, fire suppression, etc.

Determine system verifiable uses AF:

Determine total supply into the system in AF:

Does your agency keep necessary data on file to verify the answers above? Yes ○ No ○

Did your agency complete a full-scale system water audit during 2009? Yes ○ No ◉

Does your agency maintain in-house records of audit results or the completed AWWA worksheet for the completed audit which could be forwarded to CUWCC? Yes ◉ No ○

Did your agency operate a system leak detection program? Yes ○ No ◉

Comments:

version 1.0 2009

The fields in red are required.

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Reporting unit number: 88

Primary contact:

First name: Alison

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Email: ajordan@santabarbaraca.gov

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Link to FAQs

2009 BMP 1.2 Water Loss Control

View MOU

AWWA Water Audit

Agency to complete a Water Audit & Balance Using The AWWA Software ○ Yes ○ No

Email to natalie@cuwcc.org - Worksheets (AWWA Water Audit). Enter the name of the file below:

Water Audit Validity Score from AWWA spreadsheet

Agency Completed Training In The AWWA Water Audit Method ○ Yes ○ No

Agency Completed Training In The Component Analysis Process ○ Yes ○ No

Completed/Updated the Component Analysis (at least every 4 years)? ○ Yes ○ No

Component Analysis Completed/Updated Date

Water Loss Performance

Agency Repaired All Reported Leaks & Breaks To The Extent Cost Effective ○ Yes ○ No

Recording Keeping Requirements:

Date/Time Leak Reported	Leak Location
Type of Leaking Pipe Segment or Fitting	Leak Running Time From Report to Repair
Leak Volume Estimate	Cost of Repair

Agency Located and Repaired Unreported Leaks to the Extent Cost Effective ○ Yes ○ No

Type of Program Activities Used to Detect Unreported Leaks

Active water main replacement program.

Annual Summary Information

Complete the following table with annual summary information (required for reporting years 2-5 only)

Total Leaks Repaired	Economic Value Of Real Loss	Economic Value Of Apparent Loss	Miles Of System Surveyed For Leaks	Pressure Reduction Undertaken for loss reduction	Cost Of Interventions	Water Saved (AF/Year)

Comments:

version 1.0

2009

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Primary contact:

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BMP 1.3 Metering with Commodity

Link to FAQs

See the complete MOU: View MOU

See the coverage requirements for this BMP:

Implementation

Does your agency have any unmetered service connections? Yes No

If YES, has your agency completed a meter retrofit plan? Yes No

Enter the number of previously unmetered accounts fitted with meters during reporting year:

Are all new service connections being metered? Yes No

Are all new service connections being billed volumetrically? Yes No

Has your agency completed and submitted electronically to the Council a written plan, policy or program to test, repair and replace meters? Yes No

Please Fill Out The Following Matrix

Account Type	# Metered Accounts	# Metered Accounts Read	# Metered Accounts Billed by Volume	Billing Frequency Per Year	# of estimated bills/yr
Single-Family	16,873	16,873	16,873	Monthly	12
Multi-Family	6,069	6,069	6,069	Monthly	12
Commericial	2,462	2,462	2,462	Monthly	12
Industrial	55	55	55	Monthly	12
Dedicated Irrigatic	704	704	704	Monthly	12
Agricultural	55	55	55	Monthly	12
Other				Other	
Other				Other	
Other				Other	
Other				Other	

Number of CII Accounts with Mixed-use Meters: 2,289

Number of CII Accounts with Mixed-use Meters Retrofitted with Dedicated Irrigation Meters during Reporting Period: 0

Feasibility Study

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? Yes No

If YES, please fill in the following information:

A. When was the Feasiblity Study conducted

B. Email or provide a link to the feasibility study (or description of):

File name(s): Email files to natalie@cuwcc.org Enter the file name here e.g. WaterWastePreventionOrdinance

Web address(s) URL: comma-separated list Enter the URL to your documentation.

General Comments about BMP 1.3:

The fields in red are required.

Agency name: City of Santa Barbara

Reporting unit name (District name): City of Santa Barbara, PWD

Reporting unit number: 88

Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@santabarbaraca.gov

You must enter the reporting unit number that we have on record for your agency. Click here to open a table to obtain this number.

Link to FAQs

View MOU

BMP 1.4 Retail Conservation Pricing

2009

If you are reporting more rate structures than this form allows, add the structures to a spreadsheet and send the file to natalie@cuwcc.org.

Implementation (Water Rate Structure)

Enter the Water Rate Structures that are assigned to the majority of your customers, by customer class

Rate Structure	Customer Class	Total Revenue Commodity Charges	Total Revenue Customer Meter/Service (Fixed Charges)
Increasing Block		10,370,435.00	3,253,067.00
Increasing Block		5,355,212.00	1,506,727.00
Increasing Block		5,147,973.00	1,062,128.00
Increasing Block		838,042.00	71,447.00
Allocation Based		924,561.00	380,056.00
Uniform		640,557.00	119,178.00
Select a Rate Struc			

Implementation Option (Conservation Pricing Option)

- ○ Use Annual Revenue As Reported
- ○ Use Canadian Water & Wastewater Association Rate Design Model

If CWWA is select, enter the file name and email the spreadsheet to natalie@cuwcc.org

Retail Waste Water (Sewer) Rate Structure by Customer Class

Agency Provide Sewer Service ○ Yes ○ No

Select the Retail Waste Water(Sewer) Rate Structure assigned to the majority of your customers within a specific customer class.

Rate Structure	Customer Class	Total Revenue Commodity Charges	Total Revenue Customer Meter/Service (Fixed Charges)
Uniform		2,188,021.00	3,032,344.00
Uniform		2,837,678.00	2,457,934.00
Uniform		114,371.00	2,173,049.00
Uniform		19,708.00	374,443.00
Select a Rate Struc			
Select a Rate Struc			
Select a Rate Struc			

Comments:

The fields in red are required.

Agency name: City of Santa Barbara

Reporting unit name (District name): City of Santa Barbara, PWD

Reporting unit number: 88

Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@santabarbaraca.gov

Click here to open a table that displays your agency name reporting unit name and reporting unit number. Please ensure that you enter the correct information.

Link to FAQs

2009

BMP 2.1 Public Outreach - Retail Reporting

View MOU

Is a Wholesale Agency Performing Public Outreach?

Are there one or more wholesale agencies performing public outreach which can be counted to help your agency comply with the BMP? ○ Yes ○ No

Enter the name(s) of the wholesale agency (comma delimited)

Santa Barbara County Water Agency

Is your agency performing public outreach?

Report a minimum of 4 water conservation related contacts your agency had with the public during the year.

Public Information Programs List

Did at least one contact take place during each quarter of the reporting year? ✔

Number of Public Contacts	Public Information Programs
6	Newsletter articles on conservation
1,662	Flyers and/or brochures (total copies), bill stuffers, messages printed on bill, information packets
1,367	Landscape water conservation media campaigns
266	General water conservation information
24	Website

Contact with the Media

Are there one or more wholesale agencies performing media outreach which can be counted to help your agency comply with the BMP? ○ Yes ○ No

Enter the name(s) of the wholesale agency (comma delimited)

Santa Barbara County Water Agency

OR Retail Agency (Contacts with the Media)

Did at least one contact take place during each quarter of the reporting year? ✔

Media Contacts List

Number of Media Contacts	Did at least one contact take place during each quarter of the reporting year?	Media Contact Types
7		Articles or stories resulting from outreach
4		News releases
21		Newspaper contacts
664		Radio contacts
687		Television contacts
		Select a type of media contact

Is a Wholesale Agency Performing Website Updates?

Did one or more CUWCC wholesale agencies agree to assume your agency's responsibility for meeting the requirements of and for CUWCC reporting of this BMP? ○ Yes ○ No

Enter the name(s) of the wholesale agency (comma delimited)

Santa Barbara County Water Agency

Is Your Agency Performing Website Updates?

Enter your agency's URL (website address): www.savewatersb.org

Describe a minimum of four water conservation related updates to your agency's website that took place during the year:

1) Added information on the Smart Landscape Rebate Program.
2) In partnership with the County Water Agency we launched a "Water Wise Gardening in Santa Barbara County" interactive gardening website with local garden tours, garden gallery, and water wise plant list.
3) We added information and links to EPAs WaterSense program
4) We included more print material on the website that is translated into Spanish

Did at least one Website Update take place during each quarter of the reporting year? ○ Yes ○ No

Public Outreach Annual Budget

Enter budget for public outreach programs. You may enter total budget in a single line or brake the budget into discrete categories by entering many rows. Please indicate if personnel costs are included in the entry.

Category	Amount		Personnel Costs Included? If yes, check the box.	Comments	
Total Budget	$88,551				

Comments:

Public Information Programs Water Conservation Hotline. The Hotline handles the incoming calls for the Water Conservation Program. Hotline staff schedule wat

The fields in red are required.

Agency name: City of Santa Barbara

Reporting unit name (District name): City of Santa Barbara, PWD

Reporting unit number: 88

Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@santabarbaraca.gov

Click here to open a table that displays your agency name reporting unit name and reporting unit number. Please ensure that you enter the correct information.

Link to FAQs

2009

BMP 2.1 Public Outreach Cont'd

View MOU

Public Outreach Expenses

Enter expenses for public outreach programs. Please include the same kind of expenses you included in the question related to your budget (Section 2.1.7, above). For example, if you included personnel costs in the budget entered above, be sure to include them here as well.

Expense Category	Expense Amount	Personnel Costs Included?
Media Campaign/Advertising	$80,000	☐
Brochures/handouts	$8,551	☐
		☐
		☐

If yes, check the check box.

Additional Public Information Program

Please report additional public information contacts. List these additional contacts in order of how your agency views their importance / effectiveness with respect to conserving water, with the most important/ effective listed first (where 1 = most important).

Were there additional Public Outreach efforts? ○ Yes ○ No

Public Outreach Additional Information

Public Information Programs	Importance
	$1
	$2
	$3

Social Marketing Programs

Branding

Does your agency have a water conservation "brand," "theme" or mascot? ○ Yes ○ No

Describe the brand, theme or mascot. 20-Gallon Challenge

Market Research

Have you sponsored or participated in market research to refine your message? ○ Yes ○ No

Market Research Topic	
Brand Message	
Brand Mission Statement	

Community Committees

Do you have a community conservation committee? ○ Yes ○ No

Enter the names of the community committees: Partners in Water Conservation

Training

Training Type	# of Trainings	# of Attendees	Description of Other
Green Gardener Progr	$2	$70	15 week training course for 37 hours total in resource efficie
All Around Landscape	$1	$30	water wise landscape program discussion
Adult Ed Training Cour	$2	$50	Saturday morning classes held in partnership with Santa Bar

Social Marketing Expenditures

Public Outreach Social Marketing Expenses

Expense Category	Expense Amount	Description

Partnering Programs - Partners

Name	Type of Program
☐ CLCA?	member of local chapter, coordinate/promote landscape related programs
☐ Green Building Programs?	Built Green Santa Barbara member
☐ Master Gardeners?	Coordinate outreach of materials
☐ Cooperative Extension?	Cachuma RCD partner
☐ Local Colleges?	Partner in projects, lecture in courses - SBCC Environmental Horticluture Department
☐ Other	Santa Barbara Green Business Program

☐ Retail and wholesale outlet; name(s) and type(s) of programs:

Irrigation Supply Stores	partner with irrigation supply stores with rebate programs, brochures, and workshops

Partnering Programs - Newsletters

Number of newsletters per year: 2

Number of customers per year	500

Partnering with Other Utilities

Describe other utilities your agency partners with, including electrical utilities	Santa Barbara County Water Agency, Goleta Water District, Carpinteria Valley Water District, Montectio Water District, Southern CA Edison

Conservation Gardens

Describe water conservation gardens at your agency or other high traffic areas or new	The Water Conservation Program has two water wise demonstration gardens, at Alice Keck Park Memorial Garden in conjunction with the Parks Department and the Firescape Garden in conjunction with the Fire Department.

Landscape contests or awards

Describe water wise landscape contest or awards program conducted by your agency	

Comments:

The fields in red are required.

Agency name: City of Santa Barbara

Reporting unit name (District name): City of Santa Barbara, PWD

Reporting unit number: 88

Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@santabarbaraca.gov

Click here to open a table that displays your agency name reporting unit name and reporting unit number. Please ensure that you enter the correct information.

Link to FAQs

2009

BMP 2.2 School Education Programs, Retail Agencies

View MOU

School Programs

Is a wholesale agency implementing school programs which can be counted to help your agency comply with this BMP? ○ Yes ○ No

Enter Wholesaler Names, separated by commas: Santa Barbara County Water Agency

☐ Materials meet state education framework requirements?

Description of Materials: The materials we distribute include water conservation coloring books, posters, and worksheets as well as water resources and water conservation information on our website.

☐ Materials distributed to K-6 Students?

Description of materials distributed to K-6 Students: The City of Santa Barbara provides water conservation coloring books, pencils, posters, stickers, and worksheets to K-6 students

Number of students reached: 1,243

☐ Materials distributed to 7-12 Students?

Description of materials distributed to 7-12 Students: With the County Water Agency, we provide water conservation information to 7-12 graders with the Santa Barbara County Science Fair and our Water Awareness High School Video Contest. Students use our website and our brochures to gather information for their projects and videos. We also give tours to the City's Water Treatment and Wastewater Treatment Plants and hand out brochures during the tours.

Number of Distribution: 210

Annual budget for school education program: $4,000.00

Description of all other water supplier education programs: The City provides water education presentations and materials to local schools and summer camps. Tours of the City's water treatment facilities with free bus transportation are provided. The City participates in the annual Water Awareness High School Video Contest and the Santa Barbara County Science Fair with a special award on Water Awareness.

School Program Activities

Classroom presentations:

Number of presentations: 27 Number of attendees:

Large group assemblies:

Number of presentations: 0 Number of attendees: 0

Children's water festivals or other events:

Number of presentations: 1 Number of attendees: 50

Cooperative efforts with existing science/water education programs (various workshops, science fair awards or judging) and follow-up:

Number of presentations: 1 Number of attendees: 70

Other methods of disseminating information (i.e. themed age-appropriate classroom loaner kits):

Description: book bags

Number distributed: 10

Staffing children's booths at events & festivals:

Number of booths: 2

Number of attendees: 80

Water conservation contests such as poster and photo:

Description: We helped sponsor and hold the 2009 Water Awareness High School Video Contest in which high schools county-wide each submit a water conservation public service announcement. Three awards are given for 1st, 2nd, and 3rd place; the rest of the submissions receive honorable mentions.

Number distributed: 5

Offer monetary awards/funding or scholarships to students:

Number Offered: 5

Total Funding: 2650

Teacher training workshops:

Number of presentations: 0

Number of attendees: 0

Fund and/or staff student field trips to treatment facilities, recycling facilities, water conservation gardens, etc.:

Number of tours or field trips: 11

Number of participants: 359

College internships in water conservation offered:

Number of internships: 1

Total funding: $13,200

Career fairs/workshops:

Number of presentations: 1

Number of attendees: 300

Additional program(s) supported by agency but not mentioned above:

Description:

Number of events (if applicable):

Number of participants:

Total reporting period budget expenditures for school education programs (include all agency costs): $4,306

Comments

The fields in red are required.

Agency name: City of Santa Barbara

Reporting unit name (District name): City of Santa Barbara, PWD

Reporting unit number: 88

Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@SantaBarbaraCA.gov

You must enter the reporting unit number that we have on record for your agency. Click here to open a table to obtain this number.

Link to FAQs

View MOU

2009 BMP 3 Residential

○ **Traditional (Sections A - D)** ○ **Flex Track (All Sections)**

For Traditional Track please answer the fields within the traditional boxes.
For Flex Track option, please answer the fileds within the flex track boxes.
You must enter all measured water savings manually. For each measure entered, upload a spreadsheet with sufficient information to show the way that water savings were measured and that the measure was adequately tracked (i.e., all relevant data was collected) - in some cases there are specific data points also requested in form which are necessary to show that the measure was implemented as described.

A) Residential Assistance / Leak Detection

Traditional / Flex Track

	Single Family	Multi Family	Total Water Savings AF/YR	Measured Water Savings AF/YR
Total Number of Accounts	16,873.00	6,069.00		
Total Number of Participants Overall	333.00	79.00		
Total Number of Leak Det Surveys	200.00	79.00		
Total Number of Showerheads	1.00	10.00		
Total Number of Faucet Aerators	0.00	0.00		
Total Number of Landscape Water Survey	133.00	15.00		

Number of Other Components: 167.00

Description of Other Components Distributed: rain shut-off sensors

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

B) High Efficiency Clothes Washers (HECWs)

Traditional / Flex Track

Number of incentives for HECWs with an AVERAGE Water Factor of 5.0: 182.00

Are Financial incentives provided for HECWs ? ○ Yes ○ No

Has your Agency completed a HECW Market Penetration Study
(this question does not impack your coverage report, purely informational) ○ Yes ○ No

HECW Market Penetration Study Documents (Enter the file name and Email file to Natalie@cuwcc.org)

Measured water savings (AF/Year)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

C) WaterSense Specification (WSS) Toilets

(Agency must complete information for at least one coverage option (For Traditional 1, 2, or 3; For Flex Tarck 1, 2, 3, or 4).
You are encouraged to include information on other coverage options, as available.
If seeking credit for additional water savings, you must select Flex Track option)

Traditional

1. Retrofiton Resale Ordinance is in Place ○ Yes ○ No

If Yes, Choose A File (Enter the file name and Email file to Natalie@cuwcc.org)

2. A 75% Market Saturation Achieved ○ Yes ○ No

If yes, Choose A File (Enter the file name and Email file to Natalie@cuwcc.org)

3. WSS Toilets Installed

	Single Family	Multi Family
Number of WSS Toilets Installed	22.00	10.00
Measured Water Savings AF/YR		

Flex Track

4. Non-WSS Toilets

	Single Family		Multi Family	
Type of Toilets	Number of Toilets	Water Savings	Number of Toilets	Water Savings
ULFT				

Description of Other Non-WSS Type of Toilets

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

D) WSS for New Residential Development

(Agency must complete information for at least one coverage option.You are encouraged to include information on other coverageoptions, as available. If seeking credit for additional water savings you must select the Flex Track option)

Traditional

	Single Family		Multi Family	
Residential development Rebates	Yes	No	Yes	No
Recognition Programs	Yes	No	Yes	No
Reduced connection Fees	Yes	No	Yes	No
Ordinances	Yes	No	Yes	No

New Development Ordinance
(Enter the file name and Email file to Natalie@cuwcc.org)

Number of new Single Family Units built in Service Area 3.00

Number of new Multi Family Units built in Service Area 59.00

In the following table, enter one row for each incentive typr program you offer

List of Incentive Amount

Flex Track

Incentive Type	Incentive Amount	Number of WSS fixtures installed	Number of Participating		Measured Water Savings	
			Single Family	Multi Family	Single Family	Multi Family
Built Green fast	100.00	14.00	3.00	8.00		

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

For Traditional Option, Stop Here, do not go further.
For Flex Track Option, please continue...

Flex Track Menu Options

In addition to the measures on the BMP List, the Flex Track menu options may be implemented to meet the savings goal for this BMP. Fill in the water savings measures that your agency has implemented.

E) High bill contact with single-family and multi-family customers

Measured water savings (AF/Year)

Select the Types of Contact:

☐ Email ☐ Phone ☐ Letter ☐ Others (describe)

Upload sample of contact contents (email, letter, etc.)
– if applicable; enter the file name and email file to Natalie@cuwcc.org

Who initiated the contact: (Please Specify customer, agencies, or both)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)

(Enter the file name and Email file to Natalie@cuwcc.org)

F) Educate residential customers about the behavioral aspects of water conservation

Measured water savings (AF/Year)

Select types of educational methods used:	**# Events**	**# Customers Reached**
☐ Workshop		
☐ Community Event		
☐ Letter		
☐ On-Site Visit		
☐ Phone Call		
☐ Water Survey		
☐ Website Hit		
☐ Door Hanger		
☐ Other (Describe)		

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

G) Notify residential customers of leaks on the customer's side of the meter

Measured water savings (AF/Year)

Type of Notification (Describe)

How many were sent out?

Upload sample notification method(email, letter, etc.) – if applicable

(Enter the file name and Email file to Natalie@cuwcc.org

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

H) Provide bill or surcharge refunds for customers to repair leaks on the customer's side of the meter.

Measured water savings (AF/Year)

Number of Leaks Repaired

Number of bill adjustments/credits/refunds provided

Describe here or upload a document with a policy description below:

Upload file describing Policy (Enter the file name and Email file to Natalie@cuwcc.org)

If you are using your own water-savings measure, send your supporting spreadsheet

Enter the file name and Email to Natalie@cuwcc.org

I) Provide unique water savings fixtures that are not included in the BMP list above

Fixture or Device	Description	Quantity Installes	Measured water savings (AF/YR)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

J) Install residence water use monitors.

Type of Monitor	Brand	Number Installed
☐ Dashboard		
☐ Leak Detector		
☐ Data Logger		

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

K) Participate in programs that provide residences with school water conservation kits.

Number of Kits Distributed

Kit contents (including model of fixtures)

List of what was actually installed in the homes (number of showerheads, aerators etc.).

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

L) Implement an automatic meter reading program for residential customers.

AMR or AMI Select an Option

Type of Network Select an Option

Number of connections installed

☐ Is your agency using these to contact high water-use customers?

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

OTHER Types of Measures.

Type of Program	Sample / Description	Measured Water Savings (AF/YR)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

Comments

The fields in red are required.

Agency name: City of Santa Barbara

Reporting unit name (District name): City of Santa Barbara, PWD

Reporting unit number: 88

Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@santabarbaraca.gov

You must enter the reporting unit number that we have on record for your agency. Click here to open a table to obtain this number.

2009

Link to FAQs

View MOU

BMP 4 CII

Traditional ○ (Section A - L)

Flex Track ○ (All Sections)

For Traditional Track please answer the fields within the traditional boxes.
For Flex Track option, please answer the fileds within the flex track boxes.

You must enter all measured water savings manually in the summary cells on the right. For each measure entered, upload a spreadsheet with sufficient information to show the way that water savings was measured and that the measure was adequately tracked (i.e., all relevant data was collected) - in some cases there are specific data points also requested in the flex track data entry form which are necessary to show that the measure was implemented as described.

CII Type of measure implemented

Traditional

A) High - Efficiency Toilets.

Measured water savings (AF/Year)

Number: 72

Type of program: Incentive

Other type of program:

Flex Track

Do you accept the Council's default savings number for this measure? ○Yes○No

Council's Annual Water Savings 0.041748 AF per device

If not, Please provide the following:

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

B) High - Efficiency Urinals (0.5 gpf)

Traditional

Number: 6

Type of program: Incentive

Other type of program:

Measured water savings (AF/Year)

Flex Track

Do you accept the Council's default savings number for this measure? ○Yes ○No

Council's Annual Water Savings 0.069086 AF per device

If not, Please provide the following

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

C) Ultra Low Volume Urinals (0.125 gpf)

Traditional

Number: 6

Type of program: Incentive

Other type of program:

Measured water savings (AF/Year)

Flex Track

Do you accept the Council's default savings number for this measure? ○Yes ○No

Council's Annual Water Savings 0.080603 AF per device

If not, Please provide the following

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

D) Zero Consumption Urinals (0.0 gpf)

Traditional

Number: 6

Type of program: Incentive

Other type of program:

Measured water savings (AF/Year)

Flex Track

Do you accept the Council's default savings number for this measure? ○Yes ○ No

Flex Track

If not, Please provide the following:

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

Council's Annual Water Savings 0.0921146 AF per device

If you are using your own water-savings measure, send your supporting spreadsheet

Enter the file name and Email to Natalie@cuwcc.org

E) Commercial High - Efficiency Single Load Clothes Washers

Traditional

Number: 2

Type of program: Incentive

Other type of program

Measured water savings (AF/Year)

Flex Track

Do you accept the Counsil's default savings number for this measure ? ○Yes ○No

Council's Annual Water Savings 0.116618 AF per device

If not , Please provide the following:

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet

Enter the file name and Email to Natalie@cuwcc.org

F) Cooling Tower Conductivity Controllers.

Traditional

Number: 0

Type of program: Incentive

Other type of program

Measured water savings (AF/Year)

Flex Track

Do you accept the Council's default savings number for this measure ? ○Yes ○No

Council's Annual Water Savings 1.032250 AF per device

If not, Please provide the following:

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet

Enter the file name and Email to Natalie@cuwcc.org

G) Cooling Tower pH Controllers

Traditional

Number: 0

Type of program: Incentive

Other type of program:

Measured water savings (AF/Year)

Flex Track

Do you accept the Council's default savings number for this measure ? ○Yes○No

Council's Annual Water Savings 3.981543 AF per device

If not, Please provide the following:

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet

Enter the file name and Email to Natalie@cuwcc.org

H) Connectionless Food Steamers.

Traditional

Number

Type of program

Other type of program

Measured water savings (AF/Year)

Flex Track

Do you accept the Council's default savings number for this measure ? ○Yes○No

Council's Annual Water Savings 0.25 AF per Steamer Compartment

mIf not, Please provide the following:

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet

Enter the file name and Email to Natalie@cuwcc.org

I) Medical Equipment Steam Sterilizers

Flax Track

Traditional

Number

Type of program

Other type of program

Measured water savings (AF/Year)

Flex Track

Do you accept the Council's default savings number for this measure? ○Yes○No

Council's Annual Water Savings 1.538 AF per device

If not, Please provide the following:

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

J) Water - Efficient Ice Machines.

Traditional

Number

Type of program: Select an Option

Other type of program

Measured water savings (AF/Year)

Flex Track

Do you accept the Council's default savings number for this measure ? ○Yes○No

Council's Annual Water Savings 0.0834507 AF per device

If not, Please provide the following:

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

K) Pressurized Water Brooms.

Traditional

Number: 8

Type of program: Incentive

Other type of program

Measured water savings (AF/Year)

Flex Track

Do you accept the Council's default savings number for this measure? ○Yes○No

Council's Annual Water Savings 0.1534 AF per device

Flex Track

If not, Please provide the following:

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

L) Dry Vacuum Pumps.

Traditional

Number

Type of program Select an Option

Other type of program

Measured water savings (AF/Year)

Flex Track

Do you accept the Council's default savings number for this measure ? ○Yes○No

Council's Annual Water Savings 0.064 AF per device

If not, Please provide the following:

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

Traditional Reporting Stop Here, Do not continue

Flex Track Reporing Please Continue...

M) Industrial Process Water Use Reduction.

Number

Type of program Select an Option

Other type of program

Measured water savings (AF/Year)

Type of Process Water Reduced

If re-using water, what was the secondary use of the water? (such as pre-rince cycle or landscaping)

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

N) Commercial Laundry Retrofits.

Number of customers

Measured water savings (AF/Year)

Type of customer

- hotels
- campuses
- prisons
- laundromats

Lease / own machines

Lease Own Machines Both

Type of program

Select an Option

Other type of program

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

O) Industrial Laundry Retrofits.

Measured water savings (AF/Year)

Total Number of customers

Total Volume of laundry processed annually

Select an Option

Type of program

Select an Option

Other type of program

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

P) Filter Upgrades (for pools, spas, and fountains).

Number of pools upgraded

Number of spas upgraded

Number of fountains upgraded

Measured water savings (AF/Year)

Type of program

Select an Option

Other type of program

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

Q) Car Wash Reclamation Systems

Measured water savings (AF/Year)

	Conveyor	In-bay
Total Number of program participants (accounts)		
Total Number of vehicles washed annually		

Do you accept the Council's default savings number for this measure? ○Yes○No

Council's Annual Water Savings 0.00004607 (or 15 gals) per vehicle

If not, Please provide the following:

Total Measured Water Savings(AF/Year)	
Measure life (years)	
Lifetime water savings (years)	

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

R) Wet Cleaning.

		Measured water savings (AF/Year)
Brief description of program		

Total Measured Water Savings(AF/Year)	
Measure life (years)	
Lifetime water savings (years)	

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

S) Water Audits (To avoid double counting, do not include device/replacement water savings.)

Number of water audits by type of business

		Measured water savings (AF/Year)
Auto		
Food		
Health		
Hotels		

Manufacturing	
Membership	
Multi-use	
Office	
Religious	
Restaurant	
Retail/ Wholesale	
School	
Other (with description)	
Description of Other	

Total Measured Water Savings(AF/Year)	
Measure life (years)	
Lifetime water savings (years)	

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

T) Clean In Place (CIP) Technology (such as bottle sterilization in a beverage processing plant)

		Measured water savings (AF/Year)
Number of customers		
Type of program	Select an Option	
Other type of program		

Total Measured Water Savings(AF/Year)	
Measure life (years)	

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

U) Waterless Wok

Number

Type of program

Select an Option

Measured water savings (AF/Year)

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

V) Alternative On-site Water Sources (For Rain Water Harvesting, commercial rain barrels are excluded. For Foundation Drain Water, exclude permeable paving.)

Measured water savings (AF/Year)

Select type	Number	Description
☐ Cooling Condensate		
☐ Foundation Drain Water		
☐ Gray Water		
☐ Storm Water		
☐ Rain Water		
☐ Pond and Water Feature Recycling		

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

W) Sub - metering

Measured water savings (AF/Year)

Select type	Number	Description
☐ Condominiums		
☐ Apartments		
☐ Mobile Homes		

Do you accept the Council's default savings numbers for this measure? ○ Yes ○ No

Council's Annual Water Savings
Appartments & Condos=0.024419 AF/YR
Mobile Home = 0.056774 AF/Yr

If not, Please provide the following:

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

X) High Efficiency Showerheads

Measured water savings (AF/Year)

Number

Type of program Select an Option

Other type of program

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

Y) Faucet Flow Restrictors

Measured water savings (AF/Year)

Number

Type of program Select an Option

Other type of program

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

Z) Water Efficient Dishwashers

Measured water savings (AF/Year)

Select type Number

☐ Rack

☐ Conveyor

☐ Other

Description of Other

Type of program Select an Option

Other type of program

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

AA) Hot Water on Demand

Measured water savings (AF/Year)

Number

Type of program

Select an Option

Other type of program

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

BB) Pre-rinse Spray Valves of 1.3 gpm (gallons per minute) or less

Measured water savings (AF/Year)

Number

Type of program

Select an Option

Other type of program

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

CC) Central Flush Systems

		Measured water savings (AF/Year)
Number		
Type of program	Select an Option	
Other type of program		

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

Other Measures chosen by the Agency

		Measured water savings (AF/Year)
Description of program		
Sample (if applicable)		

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

The fields in red are required.

Agency name: City of Santa Barbara

Reporting unit name (District name): City of Santa Barbara, PWD

Reporting unit number: 88

Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@santabarbaraca.gov

You must enter the reporting unit number that we have on record for your agency. Click here to open a table to obtain this number.

CUWCC

2009

BMP 5 Landscape

Link to FAQs

View MOU

○ **Traditional** ○ **Flex Track**

For Traditional Track please answer the fields within the traditional boxes.
For Flex Track option, please answer the fileds within the flex track boxes.
You must enter all measured water savings manually. For each measure entered, upload a spreadsheet with sufficient information to show the way that water savings were measured and that the measure was adequately tracked (i.e., all relevant data was collected) - in some cases there are specific data point salso requested in form which are necessary to show that the measure was implemented as described.

Accounts with Dedicated Irrigation Meters

Traditional

Number of dedicated irrigation meter accounts	729.00
Number of dedicated irrigation meter accounts with water budgets	729.00
Aggregate water use for dedicated non-recreational landscape accounts with budgets	443.71
Aggregate acreage assigned water budgets for dedicated non-recreational landscape accounts with budgets	672.31
Preserved water use records and budgets for customers with dedicated landscape irrigation accounts for at least four years	○ Yes ○ No

Flex Track

Water Savings from Accounts with dedicated irrigation meters with water budgets (Acre Feet)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)

(Enter the file name and Email file to Natalie@cuwcc.org)

Technical Assistance

Traditional

Number of Accounts 20% over-budget	85.00
Number of accounts 20% over-budget offered technical assistance	0.00
Number of accounts 20% over-budget accepting technical assistance	0.00

Measured water savings (AF/Year)

Flex Track

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)

(Enter the file name and Email file to Natalie@cuwcc.org)

Irrigation Water Use Surveys for Mixed-use and Un-metered Accounts

Traditional

Number of mixed use and un-metered accounts	2,289.00
Number of irrigation water use surveys offered (cumulative, all years)	150.00
Number of irrigation water use surveys accepted (cumulative)	17.00
Can your Agency estimate the amount of landscape acreage for mixed use and Un-metered accounts	○ Yes ○ No
If Yes, Aggregate acreage for mixed use and Un-metered accounts	

Measured water savings (AF/Year)

Flex Track

Esrimated water demand from acreage for mixed use and Un-metered accounts	
Annual water savings by customers receiving irrigation water savings surveys and implementing recomendations	

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

Financial Incentives

Traditional

Have you implemented and maintained an irrigation equipment retrofit incentive program? ○ Yes ○ No

Number of incentives	Dollar value of incentives	Incentive Types	Measured Water Savings (AF/YR)
12.00	4,653.00	smart irrigation controllers,	

Flex Track

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

Traditional Reporting Stop Here, Do not continue
Flex Track Reporing Please Continue...

Landscape Flex Track Measure Types

1. Monitor and report on landscape water use

A) Measure landscapes and develop water budgets for customers with dedicated landscape meters. Provide timely water use reports with comparisons of water use to budget that provide customers the information they need to adjust irrigation schedules (such as faxes, twitter, etc. not included in the previous sections).

Measured water savings (AF/Year)

Enter the Number of sites with:

Dedicated Mixed Meters

Water Budgets

Landscape Measurements

Others (describe)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

B) Measure landscapes and develop water budgets for customers with Mixed Use meters. Provide timely water use reports with comparisons of water use to budget that provide customers the information they need to adjust irrigation schedules.

Measured water savings (AF/Year)

Enter the Number of sites with:

Dedicated Mixed Meters

Water Budgets

Landscape Measurements

Others (describe)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

C) Establish agency-wide water budget. (Note that: ETo based water budget in the MWELO changed in 2010 from .8ETo to .7ETo.)

Measured water savings (AF/Year)

Agency-wide total irrigated area (Acres)

Amount of Water Used (AF/Acre)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

D) Establish agency-wide, sector-based irrigation goal to reduce water use, based on seasonality.

Number of minimum irrigation goal (AF/Acre)

Amount of Water Used per Period (AF/Period)

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

2. Provide technical landscape resources and training

A) Upon customer requests, provide landscape irrigation management and landscape design information and resources: provide assistance, answer customer questions, respond to run-off and high-bill calls.

Measured water savings (AF/Year)

Enter the Number of:

Contacts In Person

Contacts over the phone

Contacts via Email

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

B) Perform landscape & irrigation audits: including irrigation scheduling, plant information, and landscape area measurement.

Measured water savings (AF/Year)

Enter the Number of:

Audits conducted per year

Measurement of square footage of Turf areas

Measurement of square footage of NON Turf areas

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

C) Sponsor, co-sponsor, promote, or support landscape workshops, training, presentations and other technical educational events for homeowners and professionals: design, installation, maintenance, water management.

Enter the Number of:

Events

Participants

List Type or Title of Events

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

D) Establish Time-of-Day Irrigation Restrictions.

Yes No

Describe Restrictions:

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

E) Establish Day-of-Week Irrigation Restrictions. **Yes** **No**

Describe Restrictions:

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

---

3. Provide incentives

A) Establish Landscape budget-based rates. ◯ Yes ◯ No

Describe Rates:

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

B) Provide incentives for conversions from mixed-use meters to dedicated landscape meters.

Number of Conversions:

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

C) Provide incentives for installing sub-meters to separate landscape water use

Number of meters installed:

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

D) Provide incentives for irrigation equipment upgrades that improve distribution uniformity, irrigation efficiency, or scheduling capabilities.

Select types of irrigation equipment upgrades:	Number of devices installed
☐ Controllers	
☐ Emitters	
☐ Soil moisture sensors	
☐ Pressure Regulators	
☐ Rain shut off devices	
☐ Other (describe)	

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

E) Provide incentives for the reduction of water use over an irrigated area, or reduction in the size of the irrigated area due to replacement of turf or other high water-using plants with low water-using plants, artificial turf, or permeable surfaces.

Acreage of live turf converted to low water-using plants, artificial turf, or permeable surfaces: Acres

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

F) Provide incentives for conversions from potable to recycled water.

Number of Conversions:

Number of Incentives:

Funds Invested:

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

G) Provide incentives for the use of alternative sources of water in the landscape (i.e. gray water, rainwater, cisterns, etc.)

Number of Conversions:

Number of Incentives:

Funds Invested:

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

---

4. Participate in local and regional planning and regulatory activities

A) Collaborate with planning agencies at the local and regional level, other water suppliers in the area and stakeholders in response to state or federal requirements such as the State Model Water Efficient Landscape Ordinance and AB 1881. Participate in the development, review, implementation, and enforcement of requirements for new developments. Provide water use data to planning agencies.

Measured water savings (AF/Year)

Public Information Programs List

Agency Type	Describe Involvement	If Ohter: Enter Name	Actions

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

B) Establish or participate in a water conservation advisory committee or other community outreach effort to drive market transformation and exchange information about landscape water conservation with developers, community-based organizations, homeowners associations, residential customers, landscape professionals, educators, other water suppliers in region.

Yes **No**

Describe Involvement:

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

C) Participate in regional efforts: integrated water resource management, watershed management, NPDES permit agencies, etc.

Yes **No**

Measured water savings (AF/Year)

Describe Involvement:

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

---

5. Develop a holistic approach to landscape water use efficiency

A) Develop and implement a comprehensive landscape water conservation program for all customers. Target marketing efforts to those most likely to result in benefits to both customer and Agency.

Describe Program:

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

---

6. Other Measures

A) Other Landscape Measures.

Measured water savings (Af/Year)

Describe Other Landscape Measures:

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file Natalie@cuwcc.org)

(This page intentionally left blank.)

The fields in red are required.

Agency name: City of Santa Barbara

Division name (Reporting unit): City of Santa Barbara, PWD

Reporting unit number: 88

Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@santabarbaraca.gov

WATER SOURCES

2010

Service Area Population: 93017

Potable Water

Own Supply Source Name	AF/YEAR	Water Supply Type	Water Supply Description
Cachuma Lake	8,236.00	Surface	
Gibraltar Reservoir	2,569.00	Surface	
Mission Tunnel	1,142.00	Groundwater	
Devil's Canyon	76.00	Surface	
Groundwater	1,112.00	Groundwater	
Desalination	0.00	Other	Ocean
		Other	
		Other	
		Other	
		Other	
		Other	

Imported Supply Source Name	AF/YEAR	Water Supply Type	Water Supply Description
State Water Project (SWP)	496.00	Surface	
SWP for LCMWC Conveyance	902.00	Surface	
Net imports from GWD	225.00	Surface	Water owed by the City by Goleta Wa
		Other	
		Other	
		Other	
		Other	
		Other	
		Other	
		Other	
		Other	

Exported Water Name	AF/YEAR	Where Exported?
Conveyance to LCMWC	902.00	State Water conveyed via City distribution system to La Cumbre Mu
Groundwater Injection	141.00	City groundwater basins for long-term storage

The fields in red are required.

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2010

Service Area Population: 93017

Non- Potable Water

If you select Other for type, enter

Own Supply Source Name	AF/YEAR	Water Supply Type	Water Supply Description
El Estero WWTP	729.00	Recycled Non Potable	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	

Imported Supply Source Name	AF/YEAR	Water Supply Type	Water Supply Description
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	
		Select a water type.	

Exported Water Name	AF/YEAR	Where Exported? such as groundwater recharge, retail,

The fields in red are required.

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Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@santabarbaraca.gov

Water Uses 2010

Potable Water Billed

Make sure to enter numbers in AF/Year.

Customer Type	Meter Accounts	Metered Water Delivered	Un-metered Accounts	Un-metered Water Delivered	Description
Single-Family	16,873.00	6,260.00			
Multi-Family	6,069.00	3,033.00			
Commercial	2,462.00	2,160.00			
Industrial	55.00	283.00			
Dedicated Irrigation	759.00	778.00			
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					

Potable Water Un-Billed

Customer Type	Meter Accounts	Metered Water Delivered	Un-metered Accounts	Un-metered Water Delivered	Description
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					

The fields in red are required.

Agency name: City of Santa Barbara

Division name (Reporting unit): City of Santa Barbara, PWD

Reporting unit number: 88

Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@santabarbaraca.gov

Water Uses 2010

Non-Potable Billed

Customer Type	Meter Accounts	Metered Water Delivered	Un-metered Accounts	Un-metered Water Delivered	Description
Dedicated Irrigation	79.00	728.00			
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					

Non-Potable Un-Billed

Customer Type	Meter Accounts	Metered Water Delivered	Un-metered Accounts	Un-metered Water Delivered	Description
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					

The fields in red are required.

Agency name: City of Santa Barbara

Reporting unit name (District name): City of Santa Barbara, PWD

Reporting unit number: 88

Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@santabarbaraca.gov

You must enter the reporting unit number that we have on record for your agency. Click here to open a table to obtain this number.

Link to FAQs

2010

BMP 1.1 Operations Practices

Comments:

See the complete MOU: View MOU

See the coverage requirements for this BMP:

Conservation Coordinator

Conservation Coordinator ◯ Yes ◯ No

Contact Information

First Name	Alison
Last Name	Jordan
Title	Water Conservation Coordinator
Phone	805 564-5574
Email	ajordan@SantaBarbaraCA.gov

Note that the contact information may be the same as the primary contact information at the top of the page. If this is your case, excuse the inconvenience but please enter the information again.

Water Waste Prevention

Water Agency shall do one or more of the following:

a. Enact and enforce an ordinance or establish terms of service that prohibit water waste
b. Enact and enforce an ordinance or establish terms of service for water efficient design in new development
c. Support legislation or regulations that prohibit water waste
d. Enact an ordinance or establish terms of service to facilitate implementation of water shortage response measures
e. Support local ordinances that prohibit water waste
f. Support local ordinances that establish permits requirements for water efficient design in new

To document this BMP, provide the following:

a. A description of, or electronic link to, any ordinances or terms of service
b. A description of, or electronic link to, any ordinances or requirements adopted by local jurisdictions or regulatory agencies with the water agency's service area.
c. A description of any water agency efforts to cooperate with other entities in the adoption or enforcement of local requirement
d. description of agency support positions with respect to adoption of legislation or regulations

You can show your documentation by providing files, links (web addresses), and/or entering a description.

File name(s): Email files to natalie@cuwcc.org SBMC TITLE 14 Water and Sewers,Waste of Water Enforcement Policy, Landscape Design Standards Au

Web address(s) URL: comma-separated list

Enter a description:

Waste of Water Enforcement Policy, per City Ordinance No. 4558, adopted on February 1989, prohibits the waste of water defined as gutter flooding and failure to repair leaks in a timely manner.
On August 12, 2008, the City Council adopted the revised Landscape Design Standards for Water Conservation, Resolution No. 08-083. The Landscape Design Standards were originally adopted by

The fields in red are required.

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Reporting unit number: 88

Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@santabarbaraca.gov

You must enter the reporting unit number that we have on record for your agency. Click here to open a table to obtain this number.

Link to FAQs

2010 BMP 1.2 Water Loss Control

View MOU

AWWA Water Audit

Agency to complete a Water Audit & Balance Using The AWWA Software ○ Yes ○ No

Email to natalie@cuwcc.org - Worksheets (AWWA Water Audit). Enter the name of the file below:

Water Audit Validity Score from AWWA spreadsheet

Agency Completed Training In The AWWA Water Audit Method ○ Yes ○ No

Agency Completed Training In The Component Analysis Process ○ Yes ○ No

Completed/Updated the Component Analysis (at least every 4 years)? ○ Yes ○ No

Component Analysis Completed/Updated Date

Water Loss Performance

Agency Repaired All Reported Leaks & Breaks To The Extent Cost Effective ○ Yes ○ No

Recording Keeping Requirements:

Date/Time Leak Reported	Leak Location
Type of Leaking Pipe Segment or Fitting	Leak Running Time From Report to Repair
Leak Volume Estimate	Cost of Repair

Agency Located and Repaired Unreported Leaks to the Extent Cost Effective ○ Yes ○ No

Type of Program Activities Used to Detect Unreported Leaks

Active water main replacement program.

Annual Summary Information

Complete the following table with annual summary information (required for reporting years 2-5 only)

Total Leaks Repaired	Economic Value Of Real Loss	Economic Value Of Apparent Loss	Miles Of System Surveyed For Leaks	Pressure Reduction Undertaken for loss reduction	Cost Of Interventions	Water Saved (AF/Year)

Comments:

version 1.0

2009

The fields in red are required.

Agency name: City of Santa Barbara

Reporting unit name (District name): City of Santa Barbara, PWD

Reporting unit number: 88

Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@santabarbaraca.gov

You must enter the reporting unit number that we have on record for your agency. Click here to open a table to obtain this number.

BMP 1.3 Metering with Commodity

2010

Link to FAQs

See the complete MOU: View MOU

See the coverage requirements for this BMP:

Implementation

Does your agency have any unmetered service connections? Yes No

If YES, has your agency completed a meter retrofit plan? Yes No

Enter the number of previously unmetered accounts fitted with meters during reporting year:

Are all new service connections being metered? Yes No

Are all new service connections being billed volumetrically? Yes No

Has your agency completed and submitted electronically to the Council a written plan, policy or program to test, repair and replace meters? Yes No

Please Fill Out The Following Matrix

Account Type	# Metered Accounts	# Metered Accounts Read	# Metered Accounts Billed by Volume	Billing Frequency Per Year	# of estimated bills/yr
Single-Family	16,873	16,873	16,873	Monthly	12
Multi-Family	6,069	6,069	6,069	Monthly	12
Commericial	2,462	2,462	2,462	Monthly	12
Industrial	55	55	55	Monthly	12
Dedicated Irrigatic	704	704	704	Monthly	12
Agricultural	55	55	55	Monthly	12
Other				Other	
Other				Other	
Other				Other	
Other				Other	

Number of CII Accounts with Mixed-use Meters: 2,289

Number of CII Accounts with Mixed-use Meters Retrofitted with Dedicated Irrigation Meters during Reporting Period: 0

Feasibility Study

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? Yes No

If YES, please fill in the following information:

A. When was the Feasiblity Study conducted

B. Describe, upload or provide an electronic link to the Feasibility Study Upload File

File name(s): Email files to natalie@cuwcc.org Enter the file name here e.g. WaterWastePreventionOrdinance

Web address(s) URL: comma-separated list Enter the URL to your documentation.

Comments:

The fields in red are required.

Agency name: City of Santa Barbara

Reporting unit name (District name): City of Santa Barbara, PWD

Reporting unit number: 88

Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@santabarbaraca.gov

You must enter the reporting unit number that we have on record for your agency. Click here to open a table to obtain this number.

CUWCC

2010

Link to FAQs

View MOU

BMP 1.4 Retail Conservation Pricing

If you are reporting more rate structures than this form allows, add the structures to a spreadsheet and send the file to natalie@cuwcc.org.

Implementation (Water Rate Structure)

Enter the Water Rate Structures that are assigned to the majority of your customers, by customer class

Rate Structure	Customer Class	Total Revenue Commodity Charges	Total Revenue Customer Meter/Service (Fixed Charges)
Increasing Block		10,370,435.00	3,253,067.00
Increasing Block		5,355,212.00	1,506,727.00
Increasing Block		5,147,973.00	1,062,128.00
Increasing Block		838,042.00	71,447.00
Allocation Based		924,561.00	380,056.00
Uniform		640,557.00	119,178.00
Select a Rate Struc			

Implementation Option (Conservation Pricing Option)

- ○ Use Annual Revenue As Reported
- ○ Use Canadian Water & Wastewater Association Rate Design Model

If CWWA is select, enter the file name and email the spreadsheet to natalie@cuwcc.org

Retail Waste Water (Sewer) Rate Structure by Customer Class

Agency Provide Sewer Service ○ Yes ○ No

Select the Retail Waste Water(Sewer) Rate Structure assigned to the majority of your customers within a specific customer class.

Rate Structure	Customer Class	Total Revenue Commodity Charges	Total Revenue Customer Meter/Service (Fixed Charges)
Uniform		2,188,021.00	3,032,344.00
Uniform		2,837,678.00	2,457,934.00
Uniform		114,371.00	2,173,049.00
Uniform		19,708.00	374,443.00
Select a Rate Struc			
Select a Rate Struc			
Select a Rate Struc			

Comments:

The fields in red are required.

Agency name: City of Santa Barbara

Reporting unit name (District name): City of Santa Barbara, PWD

Reporting unit number: 88

Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@santabarbaraca.gov

Click here to open a table that displays your agency name reporting unit name and reporting unit number. Please ensure that you enter the correct information.

Link to FAQs

2010

BMP 2.1 Public Outreach - Retail Reporting

View MOU

Is a Wholesale Agency Performing Public Outreach?

Are there one or more wholesale agencies performing public outreach which can be counted to help your agency comply with the BMP? ○ Yes ○ No

Enter the name(s) of the wholesale agency (comma delimited): Santa Barbara County Water Agency

Is your agency performing public outreach?

Report a minimum of 4 water conservation related contacts your agency had with the public during the year.

Public Information Programs List

Did at least one contact take place during each quarter of the reporting year? ✔

Number of Public Contacts		Public Information Programs	
6	Newsletter articles on conservation		
1,662	Newsletter articles on conservation		
1,367	Newsletter articles on conservation		
266	General water conservation information		
24	Website		

Contact with the Media

Are there one or more wholesale agencies performing media outreach which can be counted to help your agency comply with the BMP? ○ Yes ○ No

Enter the name(s) of the wholesale agency (comma delimited): Santa Barbara County Water Agency

OR Retail Agency (Contacts with the Media)

Did at least one contact take place during each quarter of the reporting year? ✔

Media Contacts List

Number of Media Contacts	Did at least one contact take place during each quarter of the reporting year?	Media Contact Types	
7	Articles or stories resulting from outreach		
4	News releases		
21	Newspaper contacts		
664	Radio contacts		
687	Television contacts		
	Select a type of media contact		

Is a Wholesale Agency Performing Website Updates?

Did one or more CUWCC wholesale agencies agree to assume your agency's responsibility for meeting the requirements of and for CUWCC reporting of this BMP? ○ Yes ○ No

Enter the name(s) of the wholesale agency (comma delimited)

Santa Barbara County Water Agency

Is Your Agency Performing Website Updates?

Enter your agency's URL (website address): www.savewatersb.org

Describe a minimum of four water conservation related updates to your agency's website that took place during the year:

1) Added information on the Smart Landscape Rebate Program.
2) In partnership with the County Water Agency we launched a "Water Wise Gardening in Santa Barbara County" interactive gardening website with local garden tours, garden gallery, and water wise plant list.
3) We added information and links to EPAs WaterSense program
4) We included more print material on the website that is translated into Spanish

Did at least one Website Update take place during each quarter of the reporting year? ○ Yes ○ No

Public Outreach Annual Budget

Enter budget for public outreach programs. You may enter total budget in a single line or brake the budget into discrete categories by entering many rows. Please indicate if personnel costs are included in the entry.

Category	Amount		Personnel Costs Included? If yes, check the box.	Comments	
Total Budget	$88,551				

Comments:

Public Information Programs Water Conservation Hotline. The Hotline handles the incoming calls for the Water Conservation Program. Hotline staff schedule wat

The fields in red are required.

Agency name: City of Santa Barbara

Reporting unit name (District name): City of Santa Barbara, PWD

Reporting unit number: 88

Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@santabarbaraca.gov

Click here to open a table that displays your agency name reporting unit name and reporting unit number. Please ensure that you enter the correct information.

Link to FAQs

2010

BMP 2.1 Public Outreach Cont'd

View MOU

Public Outreach Expenses

Enter expenses for public outreach programs. Please include the same kind of expenses you included in the question related to your budget (Section 2.1.7, above). For example, if you included personnel costs in the budget entered above, be sure to include them here as well.

Expense Category	Expense Amount	Personnel Costs Included?
Media Campaign/Advertising	$80,000	☐
Brochures/handouts	$8,551	☐
		☐
		☐

If yes, check the check box.

Additional Public Information Program

Please report additional public information contacts. List these additional contacts in order of how your agency views their importance / effectiveness with respect to conserving water, with the most important/ effective listed first (where 1 = most important).

Were there additional Public Outreach efforts? ○ Yes ○ No

Public Outreach Additional Information

Public Information Programs	Importance
	$1
	$2
	$3

Social Marketing Programs

Branding

Does your agency have a water conservation "brand," "theme" or mascot? ○ Yes ○ No

Describe the brand, theme or mascot. 20-Gallon Challenge

Market Research

Have you sponsored or participated in market research to refine your message? ○ Yes ○ No

Market Research Topic	
Brand Message	
Brand Mission Statement	

Community Committees

Do you have a community conservation committee? ○ Yes ○ No

Enter the names of the community committees: Partners in Water Conservation

Training

Training Type	# of Trainings	# of Attendees	Description of Other
Green Gardener Progr	$2	$70	15 week training course for 37 hours total in resource efficie
All Around Landscape	$1	$30	water wise landscape program discussion
Adult Ed Training Cour	$2	$50	Saturday morning classes held in partnership with Santa Bar

Social Marketing Expenditures

Public Outreach Social Marketing Expenses

Expense Category	Expense Amount	Description

Partnering Programs - Partners

Name	Type of Program
☐ CLCA?	member of local chapter, coordinate/promote landscape related programs
☐ Green Building Programs?	Built Green Santa Barbara member
☐ Master Gardeners?	Coordinate outreach of materials
☐ Cooperative Extension?	Cachuma RCD partner
☐ Local Colleges?	Partner in projects, lecture in courses - SBCC Environmental Horticluture Department
☐ Other	Santa Barbara Green Business Program

☐ Retail and wholesale outlet; name(s) and type(s) of programs:

Irrigation Supply Stores	partner with irrigation supply stores with rebate programs, brochures, and workshops

Partnering Programs - Newsletters

Number of newsletters per year: 2

Number of customers per year	500

Partnering with Other Utilities

Describe other utilities your agency partners with, including electrical utilities	Santa Barbara County Water Agency, Goleta Water District, Carpinteria Valley Water District, Montectio Water District, Southern CA Edison

Conservation Gardens

Describe water conservation gardens at your agency or other high traffic areas or new	The Water Conservation Program has two water wise demonstration gardens, at Alice Keck Park Memorial Garden in conjunction with the Parks Department and the Firescape Garden in conjunction with the Fire Department.

Landscape contests or awards

Describe water wise landscape contest or awards program conducted by your agency	

Comments:

The fields in red are required.

Agency name: City of Santa Barbara

Reporting unit name (District name): City of Santa Barbara, PWD

Reporting unit number: 88

Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@santabarbaraca.gov

Click here to open a table that displays your agency name reporting unit name and reporting unit number. Please ensure that you enter the correct information.

Link to FAQs

2010

BMP 2.2 School Education Programs, Retail Agencies

View MOU

School Programs

Is a wholesale agency implementing school programs which can be counted to help your agency comply with this BMP? ○ Yes ○ No

Enter Wholesaler Names, separated by commas: Santa Barbara County Water Agency

☐ Materials meet state education framework requirements?

Description of Materials: The materials we distribute include water conservation coloring books, posters, and worksheets as well as water resources and water conservation information on our website.

☐ Materials distributed to K-6 Students?

Description of materials distributed to K-6 Students: The City of Santa Barbara provides water conservation coloring books, pencils, posters, stickers, and worksheets to K-6 students

Number of students reached: 1,243

☐ Materials distributed to 7-12 Students?

Description of materials distributed to 7-12 Students: With the County Water Agency, we provide water conservation information to 7-12 graders with the Santa Barbara County Science Fair and our Water Awareness High School Video Contest. Students use our website and our brochures to gather information for their projects and videos. We also give tours to the City's Water Treatment and Wastewater Treatment Plants and hand out brochures during the tours.

Number of Distribution: 210

Annual budget for school education program: $4,000.00

Description of all other water supplier education programs: The City provides water education presentations and materials to local schools and summer camps. Tours of the City's water treatment facilities with free bus transportation are provided. The City participates in the annual Water Awareness High School Video Contest and the Santa Barbara County Science Fair with a special award on Water Awareness.

School Program Activities

Classroom presentations:

Number of presentations: 27 Number of attendees:

Large group assemblies:

Number of presentations: 0 Number of attendees: 0

Children's water festivals or other events:

Number of presentations: 1 Number of attendees: 50

Cooperative efforts with existing science/water education programs (various workshops, science fair awards or judging) and follow-up:

Number of presentations: 1 Number of attendees: 70

Other methods of disseminating information (i.e. themed age-appropriate classroom loaner kits):

Description: book bags

Number distributed: 10

Staffing children's booths at events & festivals:

Number of booths: 2

Number of attendees: 80

Water conservation contests such as poster and photo:

Description: We helped sponsor and hold the 2009 Water Awareness High School Video Contest in which high schools county-wide each submit a water conservation public service announcement. Three awards are given for 1st, 2nd, and 3rd place; the rest of the submissions receive honorable mentions.

Number distributed: 5

Offer monetary awards/funding or scholarships to students:

Number Offered: 5

Total Funding: 2650

Teacher training workshops:

Number of presentations: 0

Number of attendees: 0

Fund and/or staff student field trips to treatment facilities, recycling facilities, water conservation gardens, etc.:

Number of tours or field trips: 11

Number of participants: 359

College internships in water conservation offered:

Number of internships: 1

Total funding: $13,200

Career fairs/workshops:

Number of presentations: 1

Number of attendees: 300

Additional program(s) supported by agency but not mentioned above:

Description:

Number of events (if applicable):

Number of participants:

Total reporting period budget expenditures for school education programs (include all agency costs): $4,306

Comments

The fields in red are required.

Agency name: City of Santa Barbara

Reporting unit name (District name): City of Santa Barbara, PWD

Reporting unit number: 88

Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@SantaBarbaraCA.gov

You must enter the reporting unit number that we have on record for your agency. Click here to open a table to obtain this number.

Link to FAQs

View MOU

2010 BMP 3 Residential

○ **Traditional (Sections A - D)** ○ **Flex Track (All Sections)**

For Traditional Track please answer the fields within the traditional boxes.
For Flex Track option, please answer the fileds within the flex track boxes.
You must enter all measured water savings manually. For each measure entered, upload a spreadsheet with sufficient information to show the way that water savings were measured and that the measure was adequately tracked (i.e., all relevant data was collected) - in some cases there are specific data points also requested in form which are necessary to show that the measure was implemented as described.

A) Residential Assistance / Leak Detection

Flex Track

Traditional

	Single Family	Multi Family	Total Water Savings AF/YR	Measured Water Savings AF/YR
Total Number of Accounts	16,873.00	6,069.00		
Total Number of Participants Overall	333.00	79.00		
Total Number of Leak Det Surveys	200.00	79.00		
Total Number of Showerheads	1.00	10.00		
Total Number of Faucet Aerators	0.00	0.00		
Total Number of Landscape Water Survey	133.00	15.00		

Number of Other Components: 167.00

Description of Other Components Distributed: rain shut-off sensors

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

B) High Efficiency Clothes Washers (HECWs)

Flex Track

Traditional

Number of incentives for HECWs with an AVERAGE Water Factor of 5.0: 182.00

Are Financial incentives provided for HECWs ? ○ Yes ○ No

Has your Agency completed a HECW Market Penetration Study
(this question does not impack your coverage report, purely informational) ○ Yes ○ No

HECW Market Penetration Study Documents (Enter the file name and Email file to Natalie@cuwcc.org)

Measured water savings (AF/Year)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

C) WaterSense Specification (WSS) Toilets

(Agency must complete information for at least one coverage option (For Traditional 1, 2, or 3; For Flex Tarck 1, 2, 3, or 4).
You are encouraged to include information on other coverage options, as available.
If seeking credit for additional water savings, you must select Flex Track option)

Traditional

1. Retrofiton Resale Ordinance is in Place ○ Yes ○ No

If Yes, Choose A File (Enter the file name and Email file to Natalie@cuwcc.org)

2. A 75% Market Saturation Achieved ○ Yes ○ No

If yes, Choose A File (Enter the file name and Email file to Natalie@cuwcc.org)

3. WSS Toilets Installed

	Single Family	Multi Family
Number of WSS Toilets Installed	22.00	10.00
Measured Water Savings AF/YR		

Flex Track

4. Non-WSS Toilets

	Single Family		Multi Family	
Type of Toilets	Number of Toilets	Water Savings	Number of Toilets	Water Savings
1				

Description of Other Non-WSS Type of Toilets

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

D) WSS for New Residential Development

(Agency must complete information for at least one coverage option.You are encouraged to include information on other coverageoptions, as available. If seeking credit for additional water savings you must select the Flex Track option)

Traditional

	Single Family		Multi Family	
Residential development Rebates	Yes	No	Yes	No
Recognition Programs	Yes	No	Yes	No
Reduced connection Fees	Yes	No	Yes	No
Ordinances	Yes	No	Yes	No

New Development Ordinance
(Enter the file name and Email file to Natalie@cuwcc.org)

Number of new Single Family Units built in Service Area 3.00

Number of new Multi Family Units built in Service Area 59.00

Flex Track

In the following table, enter one row for each incentive typr program you offer

List of Incentive Amount

Incentive Type	Incentive Amount	Number of WSS fixtures installed	Number of Participating		Measured Water Savings	
			Single Family	Multi Family	Single Family	Multi Family
Built Green fast	100.00	14.00	3.00	8.00		

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

For Traditional Option, Stop Here, do not go further.
For Flex Track Option, please continue...

Flex Track Menu Options

In addition to the measures on the BMP List, the Flex Track menu options may be implemented to meet the savings goal for this BMP. Fill in the water savings measures that your agency has implemented.

E) High bill contact with single-family and multi-family customers

Measured water savings (AF/Year)

Select the Types of Contact:

☐ Email ☐ Phone ☐ Letter ☐ Others (describe)

Upload sample of contact contents (email, letter, etc.)
– if applicable; enter the file name and email file to Natalie@cuwcc.org

Who initiated the contact: (Please Specify customer, agencies, or both)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)

(Enter the file name and Email file to Natalie@cuwcc.org)

F) Educate residential customers about the behavioral aspects of water conservation

Measured water savings (AF/Year)

Select types of educational methods used:	**# Events**	**# Customers Reached**
☐ Workshop		
☐ Community Event		
☐ Letter		
☐ On-Site Visit		
☐ Phone Call		
☐ Water Survey		
☐ Website Hit		
☐ Door Hanger		
☐ Other (Describe)		

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

G) Notify residential customers of leaks on the customer's side of the meter

Measured water savings (AF/Year)

Type of Notification (Describe)

How many were sent out?

Upload sample notification method(email, letter, etc.) – if applicable

(Enter the file name and Email file to Natalie@cuwcc.org

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

H) Provide bill or surcharge refunds for customers to repair leaks on the customer's side of the meter.

Measured water savings (AF/Year)

Number of Leaks Repaired

Number of bill adjustments/credits/refunds provided

Describe here or upload a document with a policy description below:

Upload file describing Policy (Enter the file name and Email file to Natalie@cuwcc.org)

If you are using your own water-savings measure, send your supporting spreadsheet

Enter the file name and Email to Natalie@cuwcc.org

I) Provide unique water savings fixtures that are not included in the BMP list above

Fixture or Device	Description	Quantity Installes	Measured water savings (AF/YR)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

J) Install residence water use monitors.

Type of Monitor	Brand	Number Installed
☐ Dashboard		
☐ Leak Detector		
☐ Data Logger		

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

K) Participate in programs that provide residences with school water conservation kits.

Number of Kits Distributed

Kit contents (including model of fixtures)

List of what was actually installed in the homes (number of showerheads, aerators etc.).

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

L) Implement an automatic meter reading program for residential customers.

AMR or AMI Select an Option

Type of Network Select an Option

Number of connections installed

☐ Is your agency using these to contact high water-use customers?

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

OTHER Types of Measures.

Type of Program	Sample / Description	Measured Water Savings (AF/YR)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

Comments

The fields in red are required.

Agency name: City of Santa Barbara

Reporting unit name (District name): City of Santa Barbara, PWD

Reporting unit number: 88

Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@santabarbaraca.gov

You must enter the reporting unit number that we have on record for your agency. Click here to open a table to obtain this number.

2010

Link to FAQs

View MOU

BMP 4 CII

Traditional (Section A - L) ○ Flex Track (All Sections) ○

For Traditional Track please answer the fields within the traditional boxes.
For Flex Track option, please answer the fileds within the flex track boxes.

You must enter all measured water savings manually in the summary cells on the right. For each measure entered, upload a spreadsheet with sufficient information to show the way that water savings was measured and that the measure was adequately tracked (i.e., all relevant data was collected) - in some cases there are specific data points also requested in the flex track data entry form which are necessary to show that the measure was implemented as described.

CII Type of measure implemented

Traditional

A) High - Efficiency Toilets.

Measured water savings (AF/Year)

Number: 72

Type of program: 1

Other type of program:

Flex Track

Do you accept the Council's default savings number for this measure? ○Yes○No

Council's Annual Water Savings 0.041748 AF per device

If not, Please provide the following:

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

B) High - Efficiency Urinals (0.5 gpf)

Traditional

Number: 6

Type of program: 1

Other type of program:

Measured water savings (AF/Year)

Flex Track

Do you accept the Council's default savings number for this measure? ○Yes ○No

Council's Annual Water Savings 0.069086 AF per device

If not, Please provide the following

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

C) Ultra Low Volume Urinals (0.125 gpf)

Traditional

Number: 6

Type of program: 1

Other type of program:

Measured water savings (AF/Year)

Flex Track

Do you accept the Council's default savings number for this measure? ○Yes ○No

Council's Annual Water Savings 0.080603 AF per device

If not, Please provide the following

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

D) Zero Consumption Urinals (0.0 gpf)

Traditional

Number: 6

Type of program: 1

Other type of program:

Measured water savings (AF/Year)

Flex Track

Do you accept the Council's default savings number for this measure? ○Yes ○ No

Flex Track

If not, Please provide the following:

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

Council's Annual Water Savings 0.0921146 AF per device

If you are using your own water-savings measure, send your supporting spreadsheet

Enter the file name and Email to Natalie@cuwcc.org

E) Commercial High - Efficiency Single Load Clothes Washers

Traditional

Number: 2

Type of program: 1

Other type of program

Measured water savings (AF/Year)

Flex Track

Do you accept the Counsil's default savings number for this measure ? ○Yes ○No

Council's Annual Water Savings 0.116618 AF per device

If not , Please provide the following:

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet

Enter the file name and Email to Natalie@cuwcc.org

F) Cooling Tower Conductivity Controllers.

Traditional

Number: 0

Type of program: 1

Other type of program

Measured water savings (AF/Year)

Flex Track

Do you accept the Council's default savings number for this measure ? ○Yes ○No

Council's Annual Water Savings 1.032250 AF per device

If not, Please provide the following:

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet

Enter the file name and Email to Natalie@cuwcc.org

G) Cooling Tower pH Controllers

Traditional

Number: 0

Type of program: 1

Other type of program:

Measured water savings (AF/Year)

Flex Track

Do you accept the Council's default savings number for this measure ? ○Yes○No

Council's Annual Water Savings 3.981543 AF per device

If not, Please provide the following:

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet

Enter the file name and Email to Natalie@cuwcc.org

H) Connectionless Food Steamers.

Traditional

Number

Type of program

Other type of program

Measured water savings (AF/Year)

Flex Track

Do you accept the Council's default savings number for this measure ? ○Yes○No

Council's Annual Water Savings 0.25 AF per Steamer Compartment

mIf not, Please provide the following:

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet

Enter the file name and Email to Natalie@cuwcc.org

I) Medical Equipment Steam Sterilizers

Flax Track

Traditional

Number

Type of program

Other type of program

Measured water savings (AF/Year)

Flex Track

Do you accept the Council's default savings number for this measure? ○Yes○No

Council's Annual Water Savings 1.538 AF per device

If not, Please provide the following:

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

J) Water - Efficient Ice Machines.

Traditional

Number

Type of program: Select an Option

Other type of program

Measured water savings (AF/Year)

Flex Track

Do you accept the Council's default savings number for this measure ? ○Yes○No

Council's Annual Water Savings 0.0834507 AF per device

If not, Please provide the following:

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

K) Pressurized Water Brooms.

Traditional

Number: 8

Type of program: 1

Other type of program

Measured water savings (AF/Year)

Flex Track

Do you accept the Council's default savings number for this measure? ○Yes○No

Council's Annual Water Savings 0.1534 AF per device

Flex Track

If not, Please provide the following:

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

L) Dry Vacuum Pumps.

Traditional

Number

Type of program Select an Option

Other type of program

Measured water savings (AF/Year)

Flex Track

Do you accept the Council's default savings number for this measure ? ○Yes○No

Council's Annual Water Savings 0.064 AF per device

If not, Please provide the following:

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

Traditional Reporting Stop Here, Do not continue

Flex Track Reporing Please Continue...

M) Industrial Process Water Use Reduction.

Number

Type of program Select an Option

Other type of program

Measured water savings (AF/Year)

Type of Process Water Reduced

If re-using water, what was the secondary use of the water? (such as pre-rince cycle or landscaping)

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

N) Commercial Laundry Retrofits.

Number of customers

Measured water savings (AF/Year)

Type of customer

- hotels
- campuses
- prisons
- laundromats

Lease / own machines

Lease Own Machines Both

Type of program

Select an Option

Other type of program

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

O) Industrial Laundry Retrofits.

Measured water savings (AF/Year)

Total Number of customers

Total Volume of laundry processed annually

Select an Option

Type of program

Select an Option

Other type of program

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

P) Filter Upgrades (for pools, spas, and fountains).

Number of pools upgraded

Number of spas upgraded

Number of fountains upgraded

Measured water savings (AF/Year)

Type of program

Select an Option

Other type of program

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

Q) Car Wash Reclamation Systems

Measured water savings (AF/Year)

	Conveyor	In-bay
Total Number of program participants (accounts)		
Total Number of vehicles washed annually		

Do you accept the Council's default savings number for this measure? ○Yes○No

Council's Annual Water Savings 0.00004607 (or 15 gals) per vehicle

If not, Please provide the following:

Total Measured Water Savings(AF/Year)	
Measure life (years)	
Lifetime water savings (years)	

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

R) Wet Cleaning.

		Measured water savings (AF/Year)
Brief description of program		

Total Measured Water Savings(AF/Year)	
Measure life (years)	
Lifetime water savings (years)	

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

S) Water Audits (To avoid double counting, do not include device/replacement water savings.)

Number of water audits by type of business

		Measured water savings (AF/Year)
Auto		
Food		
Health		
Hotels		

Manufacturing	
Membership	
Multi-use	
Office	
Religious	
Restaurant	
Retail/ Wholesale	
School	
Other (with description)	
Description of Other	

Total Measured Water Savings(AF/Year)	
Measure life (years)	
Lifetime water savings (years)	

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

T) Clean In Place (CIP) Technology (such as bottle sterilization in a beverage processing plant)

		Measured water savings (AF/Year)
Number of customers		
Type of program	Select an Option	
Other type of program		

Total Measured Water Savings(AF/Year)	
Measure life (years)	

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

U) Waterless Wok

Number

Type of program

Select an Option

Measured water savings (AF/Year)

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

V) Alternative On-site Water Sources (For Rain Water Harvesting, commercial rain barrels are excluded. For Foundation Drain Water, exclude permeable paving.)

Measured water savings (AF/Year)

Select type	Number	Description
☐ Cooling Condensate		
☐ Foundation Drain Water		
☐ Gray Water		
☐ Storm Water		
☐ Rain Water		
☐ Pond and Water Feature Recycling		

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

W) Sub - metering

Measured water savings (AF/Year)

Select type	Number	Description
☐ Condominiums		
☐ Apartments		
☐ Mobile Homes		

Do you accept the Council's default savings numbers for this measure? ○ Yes ○ No

Council's Annual Water Savings
Appartments & Condos=0.024419 AF/YR
Mobile Home = 0.056774 AF/Yr

If not, Please provide the following:

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

X) High Efficiency Showerheads

Measured water savings (AF/Year)

Number

Type of program Select an Option

Other type of program

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

Y) Faucet Flow Restrictors

Measured water savings (AF/Year)

Number

Type of program Select an Option

Other type of program

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

Z) Water Efficient Dishwashers

Measured water savings (AF/Year)

Select type Number

☐ Rack

☐ Conveyor

☐ Other

Description of Other

Type of program Select an Option

Other type of program

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

AA) Hot Water on Demand

Measured water savings (AF/Year)

Number

Type of program

Select an Option

Other type of program

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

BB) Pre-rinse Spray Valves of 1.3 gpm (gallons per minute) or less

Measured water savings (AF/Year)

Number

Type of program

Select an Option

Other type of program

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

CC) Central Flush Systems

		Measured water savings (AF/Year)
Number		
Type of program	Select an Option	
Other type of program		

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

Other Measures chosen by the Agency

		Measured water savings (AF/Year)
Description of program		
Sample (if applicable)		

Total Measured Water Savings(AF/Year)

Measure life (years)

Lifetime water savings (years)

If you are using your own water-savings measure, send your supporting spreadsheet
Enter the file name and Email to Natalie@cuwcc.org

The fields in red are required.

Agency name: City of Santa Barbara

Reporting unit name (District name): City of Santa Barbara, PWD

Reporting unit number: 88

Primary contact:

First name: Alison

Last name: Jordan

Email: ajordan@santabarbaraca.gov

You must enter the reporting unit number that we have on record for your agency. Click here to open a table to obtain this number.

Link to FAQs

View MOU

2010 BMP 5 Landscape

○ Traditional ○ Flex Track

For Traditional Track please answer the fields within the traditional boxes.
For Flex Track option, please answer the fileds within the flex track boxes.
You must enter all measured water savings manually. For each measure entered, upload a spreadsheet with sufficient information to show the way that water savings were measured and that the measure was adequately tracked (i.e., all relevant data was collected) - in some cases there are specific data point salso requested in form which are necessary to show that the measure was implemented as described.

Accounts with Dedicated Irrigation Meters

Traditional

Number of dedicated irrigation meter accounts	729.00
Number of dedicated irrigation meter accounts with water budgets	729.00
Aggregate water use for dedicated non-recreational landscape accounts with budgets	443.71
Aggregate acreage assigned water budgets for dedicated non-recreational landscape accounts with budgets	672.31
Preserved water use records and budgets for customers with dedicated landscape irrigation accounts for at least four years	○ Yes ○ No

Flex Track

Water Savings from Accounts with dedicated irrigation meters with water budgets (Acre Feet)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)

(Enter the file name and Email file to Natalie@cuwcc.org)

Technical Assistance

Traditional

Number of Accounts 20% over-budget	85.00
Number of accounts 20% over-budget offered technical assistance	0.00
Number of accounts 20% over-budget accepting technical assistance	0.00

Measured water savings (AF/Year)

Flex Track

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)

(Enter the file name and Email file to Natalie@cuwcc.org)

Irrigation Water Use Surveys for Mixed-use and Un-metered Accounts

Traditional

Number of mixed use and un-metered accounts	2,289.00
Number of irrigation water use surveys offered (cumulative, all years)	150.00
Number of irrigation water use surveys accepted (cumulative)	17.00
Can your Agency estimate the amount of landscape acreage for mixed use and Un-metered accounts	○ Yes ○ No
If Yes, Aggregate acreage for mixed use and Un-metered accounts	

Measured water savings (AF/Year)

Flex Track

Esrimated water demand from acreage for mixed use and Un-metered accounts	
Annual water savings by customers receiving irrigation water savings surveys and implementing recomendations	

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

Financial Incentives

Traditional

Have you implemented and maintained an irrigation equipment retrofit incentive program? ○ Yes ○ No

Number of incentives	Dollar value of incentives	Incentive Types	Measured Water Savings (AF/YR)
12.00	4,653.00	smart irrigation controllers,	

Flex Track

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

Traditional Reporting Stop Here, Do not continue
Flex Track Reporing Please Continue...

Landscape Flex Track Measure Types

1. Monitor and report on landscape water use

A) Measure landscapes and develop water budgets for customers with dedicated landscape meters. Provide timely water use reports with comparisons of water use to budget that provide customers the information they need to adjust irrigation schedules (such as faxes, twitter, etc. not included in the previous sections).

Measured water savings (AF/Year)

Enter the Number of sites with:

Dedicated Mixed Meters

Water Budgets

Landscape Measurements

Others (describe)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

B) Measure landscapes and develop water budgets for customers with Mixed Use meters. Provide timely water use reports with comparisons of water use to budget that provide customers the information they need to adjust irrigation schedules.

Measured water savings (AF/Year)

Enter the Number of sites with:

Dedicated Mixed Meters

Water Budgets

Landscape Measurements

Others (describe)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

C) Establish agency-wide water budget. (Note that: ETo based water budget in the MWELO changed in 2010 from .8ETo to .7ETo.)

Measured water savings (AF/Year)

Agency-wide total irrigated area Per-2010 (Acres)

Agency-wide totak irrigated area Post-2010 (Acres)

Amount of Water Used (AF/Acre)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

D) Establish agency-wide, sector-based irrigation goal to reduce water use, based on seasonality.

Number of minimum irrigation goal (AF/Acre)

Amount of Water Used per Period (AF/Period)

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

2. Provide technical landscape resources and training

A) Upon customer requests, provide landscape irrigation management and landscape design information and resources: provide assistance, answer customer questions, respond to run-off and high-bill calls.

Measured water savings (AF/Year)

Enter the Number of:

Contacts In Person

Contacts over the phone

Contacts via Email

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

B) Perform landscape & irrigation audits: including irrigation scheduling, plant information, and landscape area measurement.

Measured water savings (AF/Year)

Enter the Number of:

Audits conducted per year

Measurement of square footage of Turf areas

Measurement of square footage of NON Turf areas

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

C) Sponsor, co-sponsor, promote, or support landscape workshops, training, presentations and other technical educational events for homeowners and professionals: design, installation, maintenance, water management.

Enter the Number of:

Events

Participants

List Type or Title of Events

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

D) Establish Time-of-Day Irrigation Restrictions.

Yes No

Describe Restrictions:

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

E) Establish Day-of-Week Irrigation Restrictions. **Yes** **No**

Describe Restrictions:

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data)
(Enter the file name and Email file to Natalie@cuwcc.org)

---

3. Provide incentives

A) Establish Landscape budget-based rates. ◯ Yes ◯ No

Describe Rates:

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

B) Provide incentives for conversions from mixed-use meters to dedicated landscape meters.

Number of Conversions:

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

C) Provide incentives for installing sub-meters to separate landscape water use

Number of meters installed:

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

D) Provide incentives for irrigation equipment upgrades that improve distribution uniformity, irrigation efficiency, or scheduling capabilities.

Select types of irrigation equipment upgrades:	Number of devices installed
☐ Controllers	
☐ Emitters	
☐ Soil moisture sensors	
☐ Pressure Regulators	
☐ Rain shut off devices	
☐ Other (describe)	

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

E) Provide incentives for the reduction of water use over an irrigated area, or reduction in the size of the irrigated area due to replacement of turf or other high water-using plants with low water-using plants, artificial turf, or permeable surfaces.

Acreage of live turf converted to low water-using plants, artificial turf, or permeable surfaces: Acres

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

F) Provide incentives for conversions from potable to recycled water.

Number of Conversions:

Number of Incentives:

Funds Invested:

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

G) Provide incentives for the use of alternative sources of water in the landscape (i.e. gray water, rainwater, cisterns, etc.)

Number of Conversions:

Number of Incentives:

Funds Invested:

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

---

4. Participate in local and regional planning and regulatory activities

A) Collaborate with planning agencies at the local and regional level, other water suppliers in the area and stakeholders in response to state or federal requirements such as the State Model Water Efficient Landscape Ordinance and AB 1881. Participate in the development, review, implementation, and enforcement of requirements for new developments. Provide water use data to planning agencies.

Measured water savings (AF/Year)

Public Information Programs List

Agency Type	Describe Involvement	If Ohter: Enter Name	Actions

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

B) Establish or participate in a water conservation advisory committee or other community outreach effort to drive market transformation and exchange information about landscape water conservation with developers, community-based organizations, homeowners associations, residential customers, landscape professionals, educators, other water suppliers in region.

Yes **No**

Describe Involvement:

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

C) Participate in regional efforts: integrated water resource management, watershed management, NPDES permit agencies, etc.

Yes **No**

Measured water savings (AF/Year)

Describe Involvement:

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

---

5. Develop a holistic approach to landscape water use efficiency

A) Develop and implement a comprehensive landscape water conservation program for all customers. Target marketing efforts to those most likely to result in benefits to both customer and Agency.

Describe Program:

Measured water savings (AF/Year)

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file to Natalie@cuwcc.org)

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6. Other Measures

A) Other Landscape Measures.

Measured water savings (Af/Year)

Describe Other Landscape Measures:

If there is Water Savings in this measure, upload the Methodology Spreadsheet (backup data) (Enter the file name and Email file Natalie@cuwcc.org)

Local Groundwater Assistance Grant Application
Status of Groundwater Management Plan

2010 City of Santa Barbara Water Management Report

City of Santa Barbara

Water Supply Management Report

2010 Water Year (October 1, 2009 – September 30, 2010)

Water Resources Division, Public Works Department

December 2010

INTRODUCTION

The City of Santa Barbara operates the water utility to provide water for its citizens, certain out-of-City areas, and visitors. Santa Barbara is an arid area and providing an adequate water supply requires careful management of water resources. The City has a diverse water supply including local reservoirs (Lake Cachuma and Gibraltar Reservoir), groundwater, State Water, desalination, and recycled water. The City also considers water conservation an important tool for balancing water supply and demand.

The City's Long-Term Water Supply Program (LTWSP) was adopted by City Council on July 5, 1994. While it is the current strategic plan for the City's water supply, staff is developing information and recommendations in support of an update of the LTWSP.

This annual report summarizes the following information:

- The status of water supplies at the end of the water year (September 30, 2010)
- Water conservation and demand
- Drought outlook
- Major capital projects that affect the City's ability to provide safe clean water
- Significant issues that affect the security of the City's water supplies
- A brief summary of key issues associated with the LTWSP update

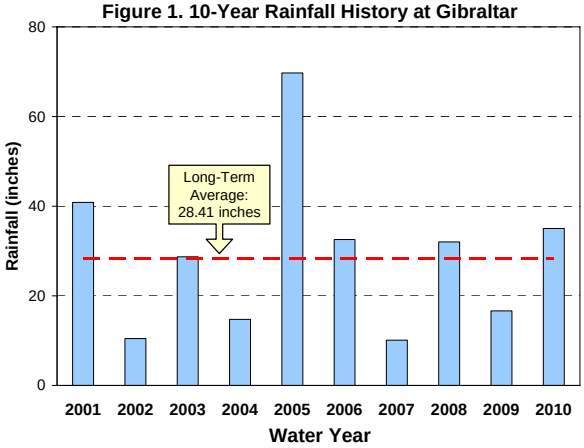
Appendix A provides supplemental detail. Additional information about the City's water supply can be found on-line at: www.SantaBarbaraCA.gov/water

On December 13, 2010, the Water Commission reviewed this report and voted to recommend adoption of the report with minor clarifications that have been included.

WATER SUPPLIES

The City has developed five different water supplies: local surface water; local groundwater (which includes water that seeps into Mission Tunnel); State Water; desalinated seawater; and recycled water. Typically, most of the City's demand is met by local surface water reservoirs and recycled water, augmented as necessary by local groundwater and State Water. The City's desalination facility is currently off-line.

Figure 1. 10-Year Rainfall History at Gibraltar



The City's local surface water comes from Gibraltar Reservoir and Lake Cachuma, both of which are located in the upper Santa Ynez River watershed. The inflow to these reservoirs is rainwater, so rainfall data for Gibraltar Reservoir is very important for water supply management purposes. Figure 1 shows rainfall for the past ten years as compared to the 50-year average. Additional historic rainfall information is included in Appendix A. Runoff generated by average rainfall is generally enough to fill Gibraltar; however, it takes above-average rainfall to produce any significant inflow to Cachuma. Rainfall during the past year was about 23% above average and Lake Cachuma received almost enough inflow to fill. To enhance rainfall, the City participates in the cloud seeding program administered by the County of Santa Barbara. However, the program has been limited in recent years due to concern about potential erosion of burn areas.

Table1, below, summarizes the status of the City's various water supplies at the end of the 2009-2010 water year.

Table 1. End of Year Status of City Water Supplies*	
Lake Cachuma	Total Capacity: 186,636 AF (2008 survey) End of Year Storage: 152,855 AF Percent of Total Capacity: 82% The City's share of the Cachuma Project normal annual deliveries is 8,277 AF. Actual use was 6,803 AF. The unused portion in the amount of 6,755 AF has been carried over to the current year.
Gibraltar Reservoir	Total Capacity: 5,251 AF (2010 survey) End of Year Storage: 2,680 AF Percent of Total Capacity: 49% Gibraltar Reservoir typically fills and spills about two out of every three years. Deliveries over the past ten years have averaged 3,276 AFY. Deliveries in 2010 were 3,331 AF.
Mission Tunnel	Groundwater that seeps into Mission Tunnel is an important part of the City's water supply, providing 1,288 AF in 2010, slightly above the long-term average.
Groundwater	Groundwater levels remain high in the downtown storage basin, since pumping has been less than the annual recharge rate during the past decade. Levels in the upper State Street area are lower than normal due to additional use of groundwater to meet water quality requirements. Four of nine production wells are currently available for production. Four additional wells feeding Ortega Groundwater Treatment Plant (OGTP) are being considered for rehabilitation in conjunction with the upgrade of the OGTP. The City used 1,273 AF of groundwater during 2010.
State Water Project (SWP)	The City has a 3,000 AF entitlement, plus 300 AF drought buffer. The Coastal Branch and Santa Ynez Extension of the SWP are in place to deliver the City's SWP water into Lake Cachuma, subject to availability of water supplies. The City used 777 AF of State Water in 2010.
Desalination	The desalination plant remains in long-term storage mode and no water was produced this year. Staff projects no need for desalinated water within at least the next 5 years.
Recycled Water	The City's recycled water system provides recycled water to parks, schools, golf courses, other large landscaped areas, and some public restrooms. The system provides approximately 5% of the total water demand. Demand from recycled water customers was 660 AF in 2010, not including process water at El Estero Wastewater Treatment Plant. In recent years, recycled water has included a significant fraction of potable water for blending to meet water quality standards and reduce mineral content. A project to address this issue is pending review of secondary treatment modifications.

*The Water year runs from October 1 through September 30. All data above is as of September 30, 2010

CITY WATER CONSERVATION PROGRAM

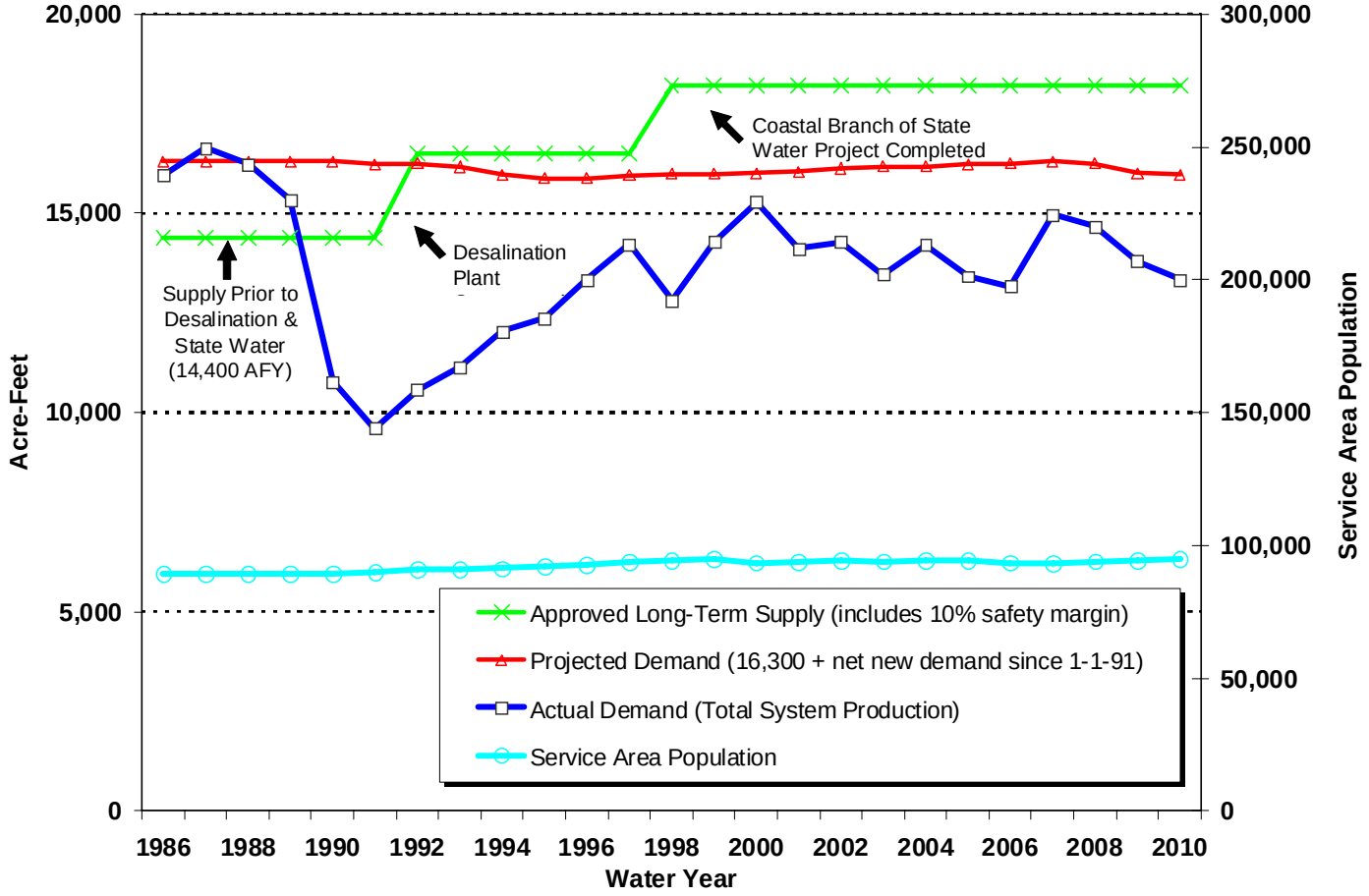
The City depends on water conservation as a part of its water supply plan and is an active member of the California Urban Water Conservation Council (CUWCC). The City's Water Conservation Program is based on implementing the Best Management Practices (BMPs) defined by CUWCC, as well as pursuing additional progressive opportunities for water conservation. Highlights of the City's water conservation program include the following activities, some of which are administered jointly with other local water agencies and the Santa Barbara County Water Agency:

- Free water check-ups for City water customers (340 indoor check-ups and 259 irrigation evaluations during the past water year). Customer survey responses about water check-ups demonstrate a continuing high level of customer satisfaction.
- Joint sponsorship of regional water efficiency programs, including the regional media campaign, the "Garden Wise Guys" television show, Water Wise Gardening for Santa Barbara County CD and website, and participating in local events and workshops.
- Green Gardener Program, which provides bilingual training for landscape maintenance professionals in resource-efficient and pollution-prevention landscape maintenance practices. Since 2000, over 1,000 Green Gardeners have participated. More info at www.greengardener.org.
- Maintain the "Watering Index" and "Landscape Watering Calculator," easy-to-use web-based tools that help estimate the right amount of water to apply to a landscape.
- Public information is provided for City water customers including a wide variety of web-based conservation information at the City's web site (www.savewatersb.org) and the regional web site (www.sbwater.org). Additionally, over 20 different brochures on water efficient practices and water wise landscaping are available free to City water customers.
- Water education program reaching approximately 2,000 K-12th grade students per year through classroom presentations, wastewater treatment plant tours, curriculum distribution, and the Water Awareness High School Video Contest.
- Hotels and motels are being contacted to encourage participation in public information efforts aimed at their guests. Table tents are available for restaurants to provide notice that water will be served upon request.
- Continued the Smart Landscape Rebate Program, offering rebates to increase water efficiency in both commercial and residential landscapes. Rebates on approved irrigation equipment and landscape materials are up to 50% of material costs. For Residential customers: Any combination of irrigation equipment and planting costs may qualify up to a one-time, maximum rebate of $1,000. For Commercial and Multi-Family customers, including home-owners associations: A maximum rebate amount of $2,000 per account serving irrigated area, and $4,000 per site. A pre-inspection is required for to confirm eligibility for all rebates.
- Rain Sensor Program, which provides a free rain sensor to City water customers. A rain sensor automatically shuts off the irrigation controller during and immediately after it rains.
- Held a hands-on "Laundry to Landscape" Graywater System workshop which twenty landscape professionals attended.

MONITORING OF WATER SUPPLY AND DEMAND

Water demand is measured by water production, because water is produced to meet the demand. Figure 2 illustrates the tracking of supply and demand during the period of the LTWSP. It shows the 1988 approved water supply, and how it was augmented with desalination and State Water. It also shows the history of demand, both on an actual basis and as a theoretical year by year demand projection, reflecting the estimated net effect of new development and identifiable conservation savings since 1991. This graph illustrates the current LTWSP, now about to be updated. Staff expects a different format will be used upon adoption of the new LTWSP.

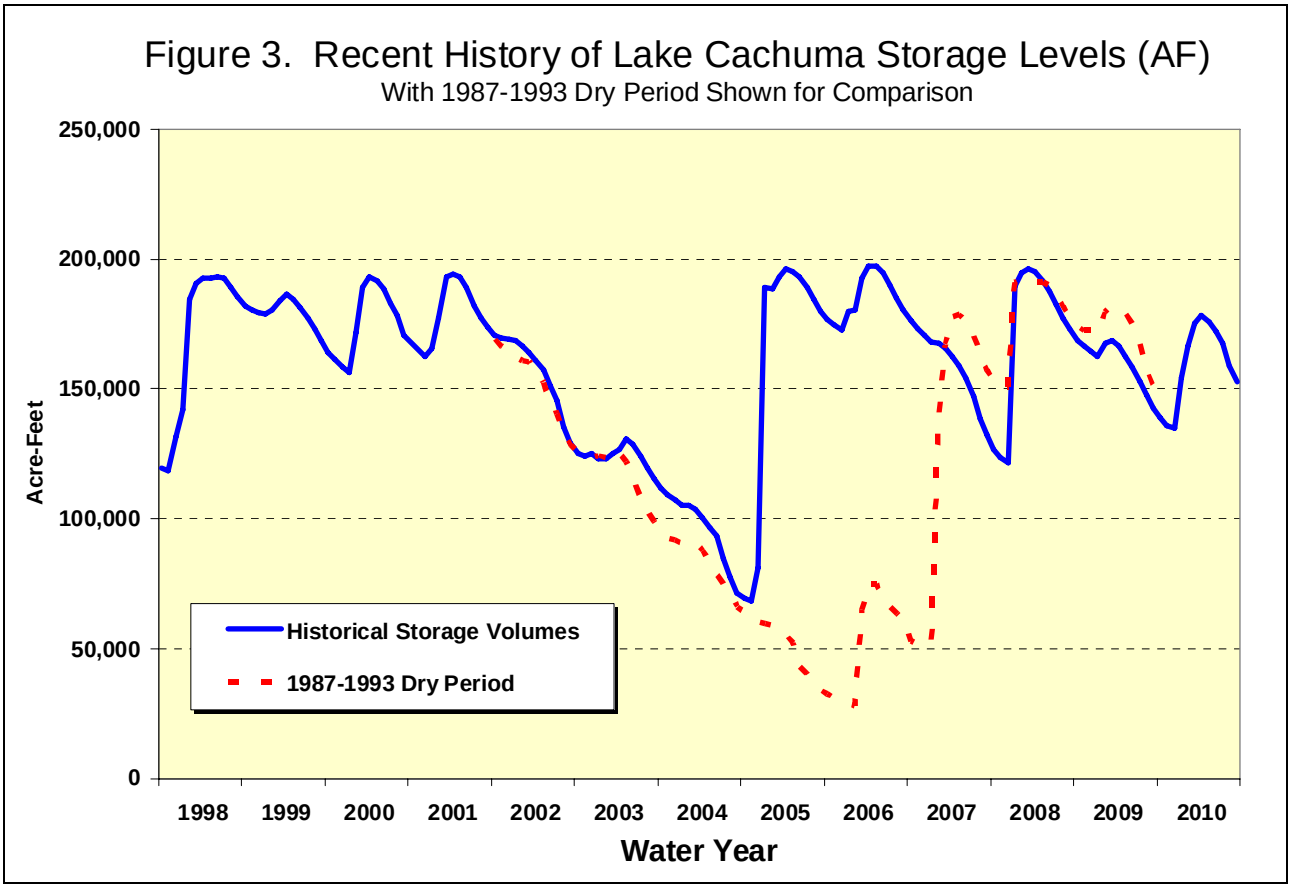
Figure 2. Water Supply and Demand (AFY)



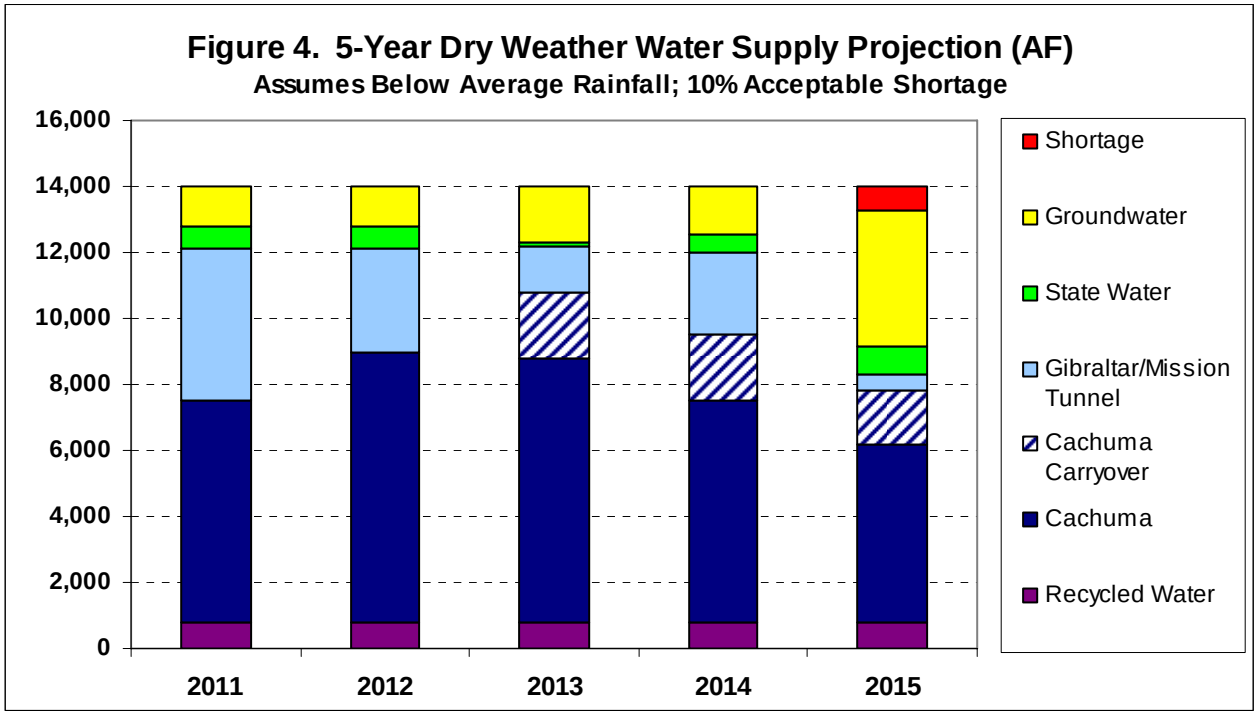
Total system water production (potable plus recycled water) for the 2009-2010 water year was 13,341 AF. This is below the estimated normal year water demand of 14,000 AFY, reflecting somewhat above average rainfall for the year, following three years of below average rainfall, including extraordinarily dry weather in 2007. The lower demand may also reflect the poor economic situation.

DROUGHT OUTLOOK

Because the City depends heavily on local surface water, drought is the situation most likely to reduce our available water supplies. Lake Cachuma is our primary source of surface water and its storage level is the most important indicator of potential near-term drought impacts. Figure 3 shows a recent history of storage levels at Lake Cachuma. The severe drought period of 1987-1993 is also shown for comparison to the less severe dry period of 2002 through 2004. Cachuma members normally begin to take voluntary reductions in deliveries when the reservoir storage drops below 100,000 AF as a way of stretching supplies in case drought continues.



The City's water supply is planned to meet 100% of normal year demand in most years and no less than 90% of normal year demand during a 5-year period of below average rainfall, which defines our "critical drought period." When rainfall is below average, there is limited inflow to Lake Cachuma and the storage level continues to drop. So we typically plan as if the first year after a spill at Cachuma is the first year of a 5-year critical drought period. Figure 4 shows a projection of how we would expect to meet a current normal year demand of 14,000 AFY over such a 5-year period beginning with the current (2011) water year and assuming continued below average rainfall and minimal inflow to Lake Cachuma. The figure shows Cachuma carryover and increased groundwater pumping to offset reductions in surface water availability as the drought progresses. The projection shows a 5% shortage in the fifth year, which is consistent with the LTWSP standard of an acceptable shortage of up to 10% during a critical drought period.



CAPITAL PROJECTS

Staff continues work on a number of projects to improve the reliability and quality of City water supplies:

- ***Ortega Groundwater Treatment Plant:*** A comprehensive process to identify the optimal treatment scheme has been conducted, and a rehabilitation and upgrade of the plant is expected to be bid within the next several months. The project aims to preserve an important part of the City's water supply for use to meet peak demands, provide back-up for depleted surface water supplies during drought, and serve as an emergency water supply in the event of catastrophic supply interruptions.

- ***Advanced Water Treatment Project:*** The design for addition of ozone treatment facilities at the Cater Water Treatment Plant has been completed. A low-interest State Revolving Fund loan has been approved to fund this project as well as groundwater treatment improvements, well rehabilitation, and distribution system improvements at Reservoir No. 1. These improvements will facilitate distribution of water from low elevations to higher zones as would be necessary during catastrophic water supply interruptions. The ozone project is expected to allow the City to more reliably meet pending water quality regulations.

- ***Recycled Water Treatment Plant Rehabilitation:*** Funding has been appropriated to rehabilitate the recycled water filters. However, this project has been suspended pending evaluation of how to better treat the wastewater to achieve readily filterable water.

WATER SUPPLY ISSUES

There are a number of significant issues related to the City's water supplies, discussed briefly below.

Cachuma Project Water Rights Hearing: The Bureau of Reclamation and the members of the Cachuma Project continue to await a decision by the State Water Resources Control Board (SWRCB) following a major hearing on the Cachuma Project's water rights completed in November 2003. This was a continuation of SWRCB's long-standing review of the Cachuma Project operations in terms of its effects on downstream water users and on public trust resources (steelhead trout). A December 2002 settlement agreement resolved a number of issues among several of the participants in the hearing, and is under consideration by the SWRCB. The SWRCB ruling has been repeatedly delayed pending completion of the necessary environmental documents. The Final EIR for Cachuma operations is now expected to be released in spring 2011; however a new SWRCB water rights decision is not anticipated until summer 2011. The SWRCB decision could affect the amount of water available from Cachuma for water supply purposes.

Gibraltar Pass Through Operations: The Zaca Fire burned approximately 60% of the Gibraltar Reservoir watershed, normally the source of about 35% of the City's water supply. On top of historical siltation, the reservoir's storage capacity has now been reduced by an additional 1,535 AF, leaving a storage volume of 5,250 AF. In 1989, the City entered into the Upper Santa Ynez River Operations Agreement (the "Pass Through Agreement") with other members of the Cachuma Project. The City agreed to defer its planned enlargement of Gibraltar Reservoir in exchange for provisions that would allow the City to "pass through" a portion of its Gibraltar water to Lake Cachuma for delivery through Cachuma Project facilities. The City has elected to commence this phase of operations and is working with the U.S. Bureau of Reclamation to negotiate a "Warren Act" contract, as required by federal law to allow such use of the Cachuma Project. Modeling work is underway to assess the effects of Pass Through operations as required for an environmental assessment. The Pass Through option will allow the City to maintain its historical deliveries as the Gibraltar Reservoir continues to silt in.

State Water Project/Delta Smelt-Wanger Decision: The Sacramento-San Joaquin Delta is the source of all water moved to the south by the State Water Project. There is substantial debate about the relative importance of water supply and environmental benefits in regard to how the Delta is managed. The current approach is that these two co-equal goals need to be acknowledged as a part of any solution.

Delivery allocations are forecasted as a percentage of each member's maximum delivery amount (referred to as "Table A" amount). Beginning in 2007, a number of federal court decisions impacted diversions from the Delta, meaning a reduction in the delivery allocations for State Project members. At the same time the state was experiencing a prolonged dry period. More recently, there has been some easing of those restrictions and State Water supplies are also more plentiful due to near average runoff amounts during 2010. Following is a table listing State Water Project run-off conditions and delivery allocations for the past five years:

Water Year	Runoff Conditions (Sacramento River watershed)	SWP Delivery Allocation (% of "Table A" Amount)
2006	Wet	100%
2007	Dry	60%
2008	Critically Dry	35%
2009	Dry	40%
2010	Below Normal	50%

The State has issued an initial allocation of 25% for the 2011 water year, which can be expected to increase to the extent precipitation and runoff continue to occur in Northern California during the 2011 water year. The City relies on State Water to a limited extent, but it can be an important source of water for banking as a part of increasing the reliability of our water supply.

Long-Term Water Supply Program Update: Over the past two years, staff has developed a number of analyses in support of an updated Long Term Water Supply Program (LTWSP) as well as the *Plan Santa Barbara* process. The Water Commission has been briefed and has commented on this information as it was developed. During the first half of 2011, we will be presenting a summary analysis of our current and future water supply needs and developing a recommendation for an updated LTWSP. A number of key issues will be addressed:

- Demand Target: The current LTWSP (adopted in 1994) estimated a normal year demand of 16,400 AFY not including the safety margin. Current demand is approximately 14,000 AFY, reflecting an active conservation program, tiered-rate water pricing, stricter plumbing codes and appliance efficiency standards, and new technologies for improving efficiency. An updated demand target will be the foundation of the updated supply analysis.
- Conservation Program: A comprehensive model of our Water Conservation Program has been completed to identify practical and cost-effective conservation measures for the next 20-year planning period. An important factor will be the recent addition to State law requiring 20% reduction in urban per capita water use by 2020.
- Safety Margin: After determining the best estimate of anticipated demand, we have historically added a 10% "safety margin" to account for unplanned shortages in supplies and increases in demand. We are reviewing this value to confirm that it is still appropriate.
- Updated Supply Assessment: Supplies from Gibraltar Reservoir, Lake Cachuma, the State Water Project, groundwater, desalination, and recycled water are being evaluated to develop updated estimates of yield, cost, and effectiveness in improving the reliability of the water supply. The role of desalination in particular is being re-examined, as well as the potential for expanded use of recycled water.
- Acceptable Shortage: Our current LTWSP is planned around 100% deliveries in most years and up to 10% acceptable shortage during a "critical drought period." which has historically had a return frequency of once every 30 to 40 years. This 10% shortage is addressed by extraordinary cutbacks in customer water use to help get us through the drought. During the last severe drought of 1987-1992, it was necessary for customer demand to be reduced by as much as 50%, resulting in

excessive hardship for the community, which influenced the decision to establish the acceptable shortage at 10%. This value will also be reviewed as a part of the LTWSP update.

Appendix A – Supplemental Water Supply Information

Groundwater Balance

Project conditions of the State Water Project (SWP) require the City to use SWP water to offset any demonstrated groundwater basin overdraft. Under the LTWSP, the City uses groundwater conjunctively with surface supplies, such that significant groundwater use only occurs when surface supplies are reduced. Basins are rested following periods of heavy pumping to allow water levels to recover. As summarized in Table A-1, the perennial yield exceeds average annual pumping and groundwater basins are in long-term balance with no overdraft projected. More detailed analysis is available in the LTWSP Environmental Impact Report.

Table A-1. Groundwater Balance

Estimated Perennial Groundwater Yield of 3 Groundwater Storage Units:	1,900 AFY
Approximate Pumping by Private Pumpers:	-500 AFY
Net Perennial Yield Available to the City:	1,400 AFY
Average projected City groundwater pumping under LTWSP analysis at full LTWSP demand of 18,200 AFY:	1,000 to 1,300 AFY
Groundwater Production in 2009-2010:	1,273 AF

Projection of Supply Availability

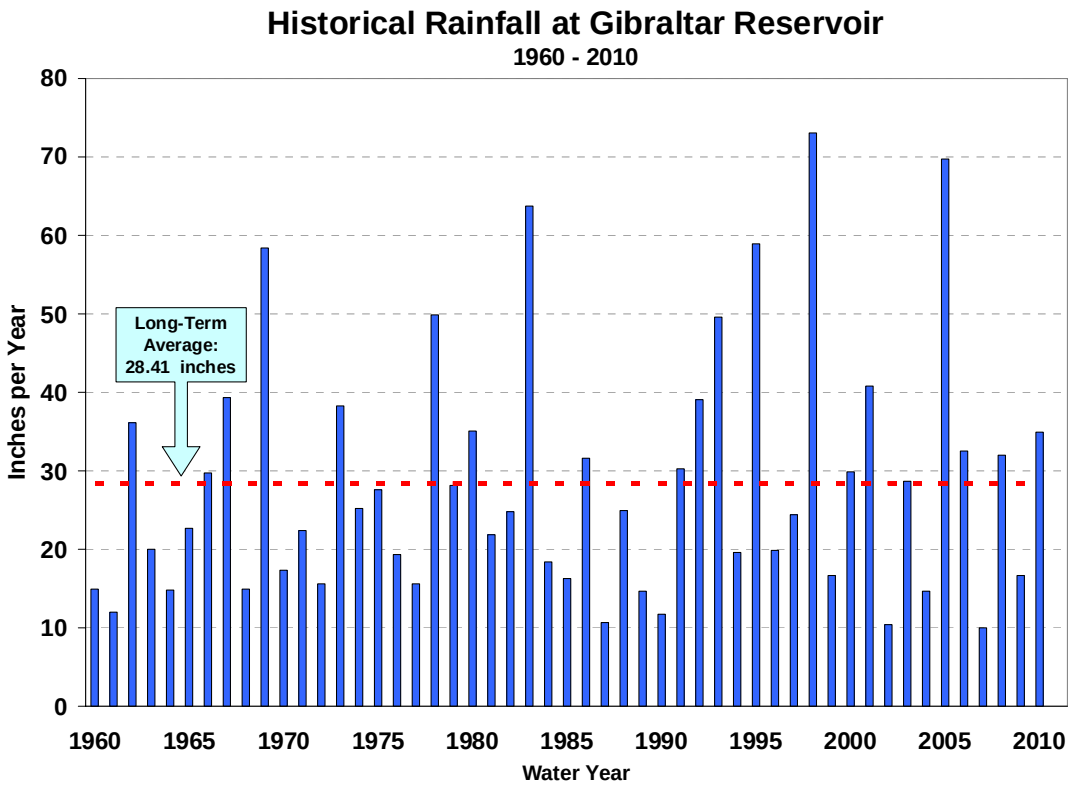
Table A-2 summarizes the City's water supply sources and fulfills a requirement of the project conditions for the SWP. The projected 2010-2011 Supply Plan reflects a projected total demand of 14,000 AF.

Table A-2. Sources of Supply (AF)

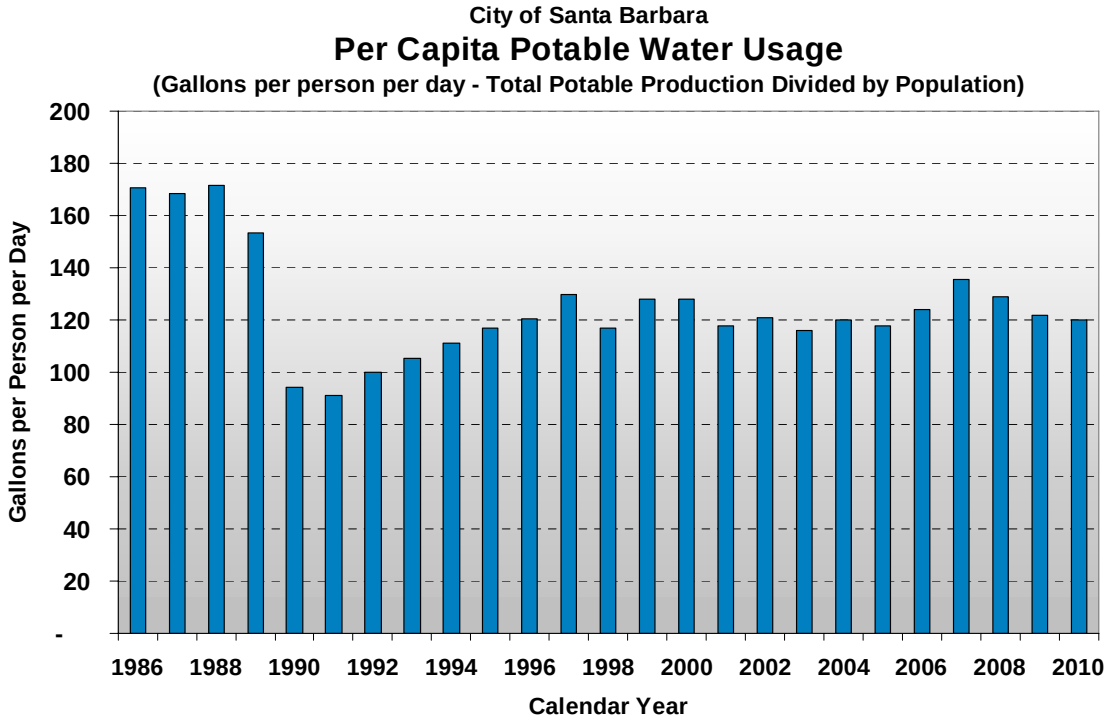
Source of Supply	WY 2010 Original Plan	WY 2010 Actual	WY 2011 Supply Plan Projected
Gibraltar Reservoir	3,600	3,331	3,413
Cachuma Project	6,940	6,803	6,732
Mission Tunnel	1,200	1,288	1,200
Devil's Canyon	(w/ Gibraltar)	0	(w/ Gibraltar)
Juncal Res. (300 AF from MWD)	(w/ Cachuma)	(w/ Cachuma)	(w/ Cachuma)
State Water Project	427	777	650
Groundwater	1,034	1,273	1,206
Desalination	0	0	0
Recycled Water	800	660	800
Net Other Supplies[1]	(na)	-791	(na)
Total Production:	14,000	13,341	14,000
Total Demand:	14,000	13,341	14,000
Percent Shortage:	0	0	0

[1] Represents miscellaneous production sources (positive values) and water used from the distribution system for purposes such as transfers to adjacent water purveyors, groundwater recharge, or blending with recycled water (negative values).

Long-Term Rainfall Data



Per Capita Water Usage



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Local Groundwater Assistance Grant Application
Status of Groundwater Management Plan

2011 City of Santa Barbara Water Management Report

City of Santa Barbara

Water Supply Management Report

2011 Water Year (October 1, 2010 – September 30, 2011)

Water Resources Division, Public Works Department

December 2011

DRAFT

INTRODUCTION

The City of Santa Barbara operates the water utility to provide water for its citizens, certain out-of-City areas, and visitors. Santa Barbara is an arid area and providing an adequate water supply requires careful management of water resources. The City has a diverse water supply including local reservoirs (Lake Cachuma and Gibraltar Reservoir), groundwater, State Water, desalination, and recycled water. The City also considers water conservation an important tool for balancing water supply and demand. The City's current Long-Term Water Supply Plan (LTWSP) was adopted by City Council on June 14, 2011.

This annual report summarizes the following information:

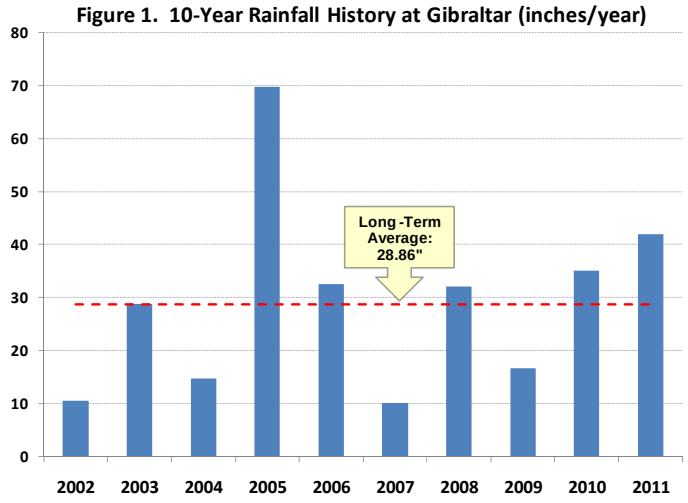
- The status of water supplies at the end of the water year (September 30, 2011)
- Water conservation and demand
- Drought outlook
- Major capital projects that affect the City's ability to provide safe clean water
- Significant issues that affect the security of the City's water supplies
- A brief summary of key issues associated with the new LTWSP

Appendix A provides supplemental detail. Additional information about the City's water supply can be found on-line at: www.SantaBarbaraCA.gov/water

On November 14, 2011, the Water Commission reviewed this report and voted to_____ _____.

WATER SUPPLIES

The City has developed five different water supplies: local surface water; local groundwater (which includes water that seeps into Mission Tunnel); State Water; desalinated seawater; and recycled water. Typically, most of the City's demand is met by local surface water reservoirs and recycled water, augmented as necessary by local groundwater and State Water. The City's desalination facility is currently off-line.



The City's local surface water comes from Gibraltar Reservoir and Lake Cachuma, both of which are located in the upper Santa Ynez River watershed. The inflow to these reservoirs is rainwater, so rainfall data for Gibraltar Reservoir is important for water supply management purposes. Figure 1 shows rainfall for the past ten years as compared to the 52-year average. Additional historic rainfall information is included in Appendix A. Runoff generated by average rainfall is generally enough to fill Gibraltar; however, it takes above-average rainfall to produce any significant inflow to Cachuma. Rainfall during the past year was about 46% above average, more than enough to fill Lake Cachuma. To enhance rainfall, the City participates in the cloud seeding program administered by the County of Santa Barbara. However, the program has been limited in recent years due to concern about potential erosion of burn areas.

Table1, below, summarizes the status of the City's various water supplies at the end of the 2010-2011 water year.

Table 1. End of Year Status of City Water Supplies*	
Lake Cachuma	Total Capacity: 186,636 AF (2008 survey for 750' elevation) End of Year Storage: 180,986 AF Percent of Total Capacity: 97% The City's share of the Cachuma Project normal annual deliveries is 8,277 AF. Actual use was 8,911 AF. Remaining entitlement of 5,789 AF has been carried over to the current year.
Gibraltar Reservoir	Total Capacity: 5,251 AF (2010 survey) End of Year Storage: 3,084 AF Percent of Total Capacity: 59% Gibraltar Reservoir typically fills and spills about two out of every three years. Deliveries over the past ten years have averaged 2,932 AFY. Deliveries in 2011 were 1,987 AF.
Mission Tunnel	Groundwater that seeps into Mission Tunnel is an important part of the City's water supply, providing 1,342 AF in 2011, about 17% above the long-term average.
Groundwater	Groundwater levels remain high in the downtown storage basin, since pumping has been less than the annual recharge rate during the past decade. Levels in the upper State Street area have lower than normal due to additional use of groundwater to meet water quality requirements. Four of nine production wells are currently available for use. The City used 506 AF of groundwater during 2011.
State Water Project (SWP)	The City has a 3,000 AF entitlement, plus 300 AF drought buffer. The Coastal Branch and Santa Ynez Extension of the SWP are in place to deliver the City's SWP water into Lake Cachuma, subject to availability of water supplies. The City used 750 AF of State Water in 2011.
Desalination	The desalination plant remains in long-term storage mode and no water was produced this year. Staff projects no need for desalinated water within at least the next 5 years.
Recycled Water	The City's recycled water system serves parks, schools, golf courses, other large landscaped areas, and some public restrooms. The system provides approximately 5% of the total water demand. Customer demand was 648 AF in 2011, not including process water at El Estero Wastewater Treatment Plant. In recent years, recycled water has included a significant fraction of potable water for blending to meet water quality standards and reduce mineral content. A review of secondary treatment modifications has been completed and identified modifications to improve water quality.

*The Water year runs from October 1 through September 30. All data above is as of September 30, 2011

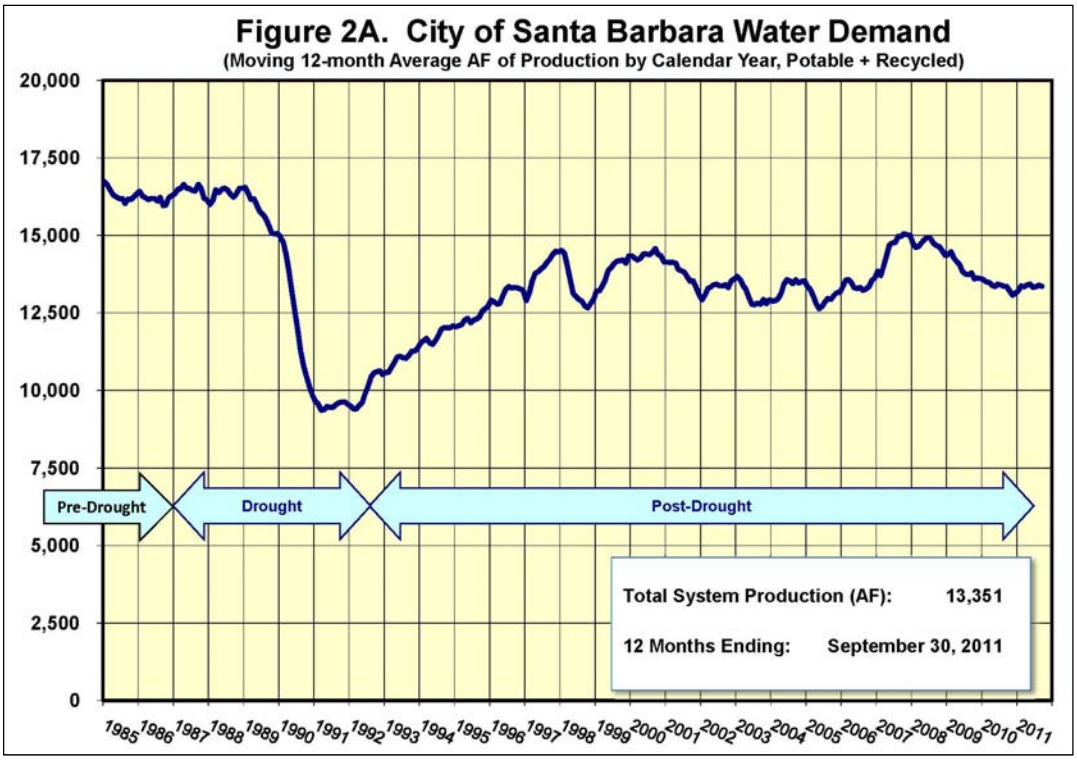
CITY WATER CONSERVATION PROGRAM

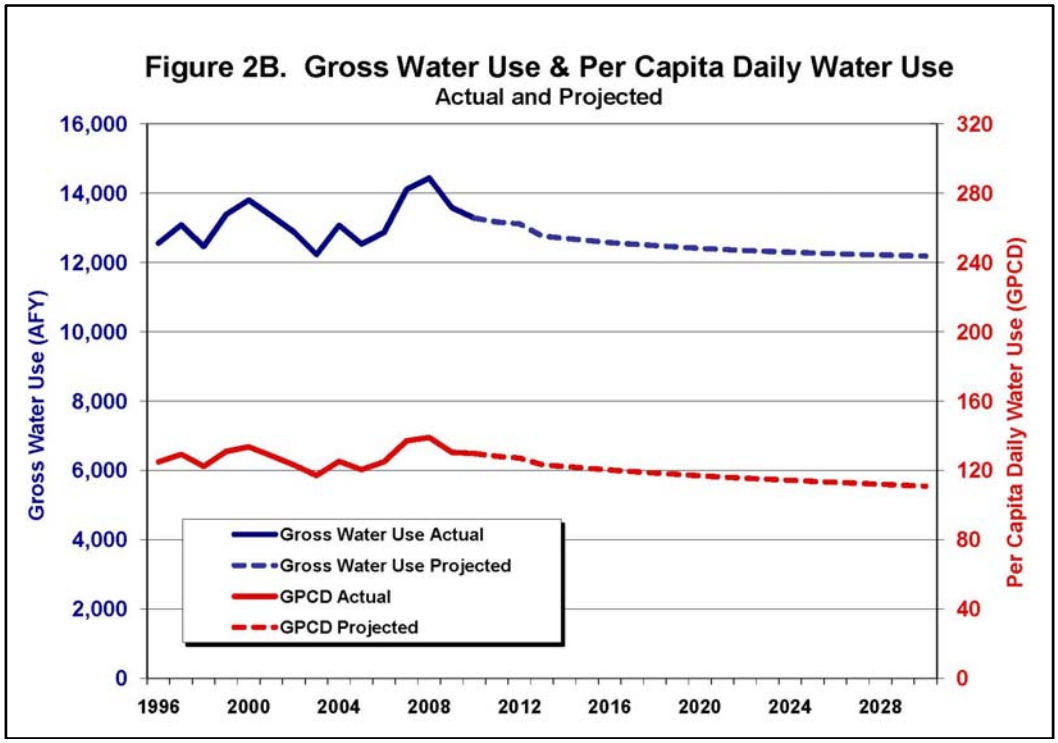
The City depends on water conservation as a part of its water supply plan. The City's current Water Conservation Program is a combination of the City's commitment to carrying out the California Urban Water Conservation Council's (CUWCC) Best Management Practices, achieving compliance with the States' per capita water use targets, and the City's dedication to water conservation as an element of the recently updated LTWSP. Highlights of the City's Water Conservation Program include the following activities:

- Smart Landscape Rebate Program: 50% rebate on eligible, pre-approved material costs for landscape water efficiency;
- Free residential and commercial water check-ups (558 completed this year);
- Smart Rebates Program administered by the California Urban Water Conservation Council (CUWCC), providing incentives for non-landscape measures;
- "Garden Wise Guys" television show on Water Wise gardening;
- City's web site at www.savewatersb.org;
- Water education program reaching approximately 2,000 K-12th grade students per year; and
- Targeted billing system analysis to reach customers with particularly high water usage.

MONITORING OF WATER SUPPLY AND DEMAND

Water demand has traditionally been measured by total water system production, because water is produced to meet the customer demand. This includes both potable and recycled water. New State requirements for water conservation have established a "20% by 2020" target based on what is called "Gross Water Use." The definition includes all potable water used within the service area, except for agricultural deliveries and groundwater recharge. It does not include recycled water use, except for the potable water blending component. Since the production numbers provide historical context on our demand, and the Gross Water Use is the new mandatory metric, both are expected to be tracked. Figure 2A illustrates the traditional historical tracking of water system demand. Figure 2B shows the recent history and 20-year projection of Gross Water Use and Per Capita Daily Water Use, calculated in accordance with State requirements for meeting the "20 x 2020" conservation mandate.





Total system water production for the 2010-2011 water year was 13,351 AF. This is below the estimated normal year water demand of 14,000 AFY, reflecting somewhat above average rainfall for the year, following three years of below average rainfall, including extraordinarily dry weather in 2007. The lower demand may also reflect the poor economic situation.

DROUGHT OUTLOOK

Because the City depends heavily on local surface water, drought is the situation most likely to reduce our available water supplies. Lake Cachuma is our primary source of surface water and its storage level is the most important indicator of potential near-term drought impacts. Figure 3 shows a recent history of storage levels at Lake Cachuma. The severe drought period of 1987-1993 is also shown for comparison to the less severe dry period of 2002 through 2004. Cachuma members normally begin to take voluntary reductions in deliveries when the reservoir storage drops below 100,000 AF as a way of stretching supplies in case drought continues.

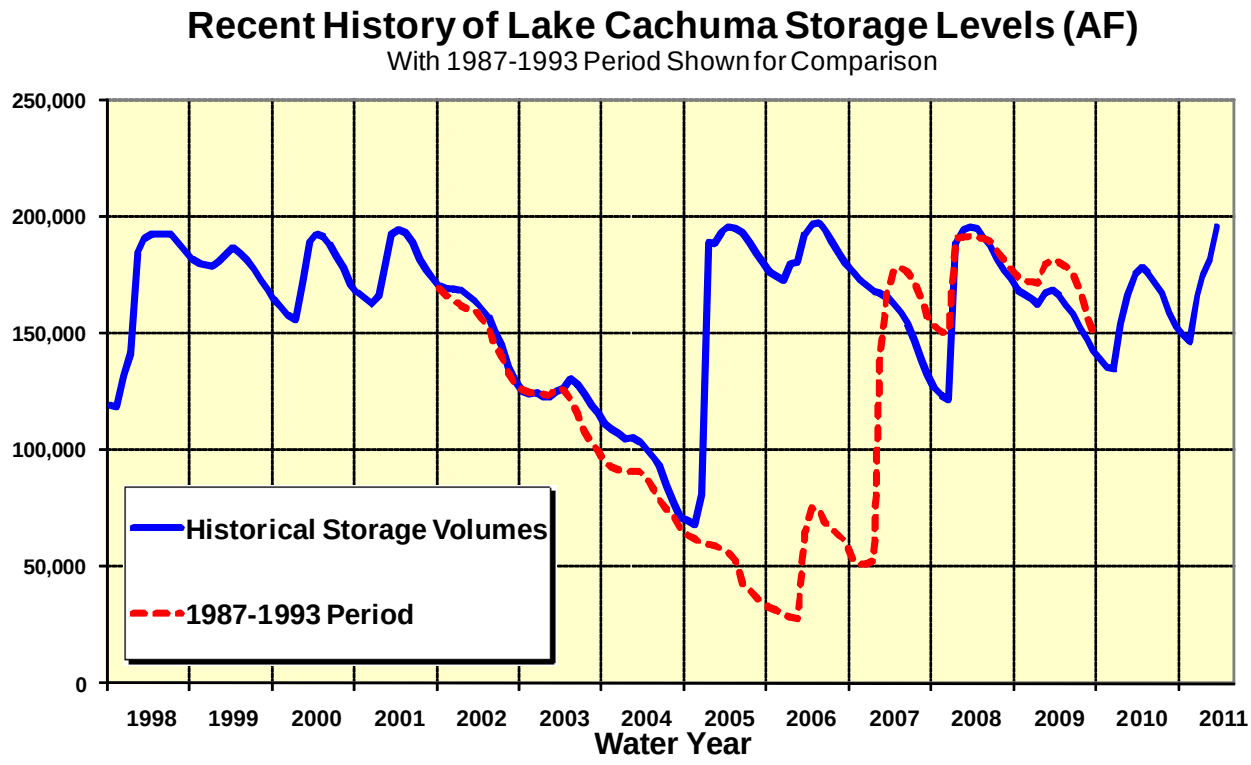
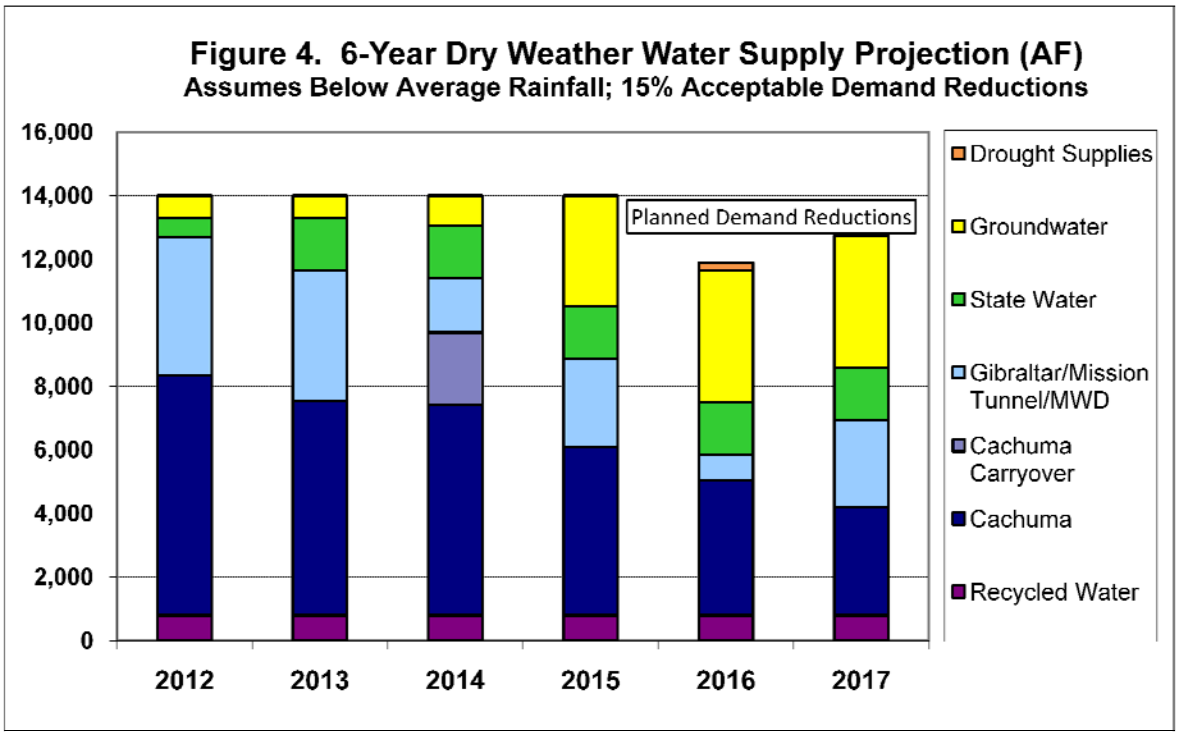


Figure 3

Under the new LTWSP, the City's water supply is planned to meet 100% of normal year demand in most years and no less than 85% of normal year demand during the latter portion of a 6-year period of below average rainfall, which defines our "critical drought period." When rainfall is below average, there is limited inflow to Lake Cachuma and the storage level continues to drop. So our management plan now assumes the first year after a spill at Cachuma may be the first year of a 6-year critical drought period. Figure 4 shows a projection of how we would expect to meet a current normal year demand of 14,000 AFY over such a 6-year period beginning with the current (2012) water year and assuming continued below average rainfall and minimal inflow to Lake Cachuma. The figure shows Cachuma carryover and increased groundwater pumping to offset reductions in surface water availability as the drought progresses. The projection shows planned reductions in demand of 15% and 9% for the fifth and sixth years respectively, which is consistent with the planned shortage policy in the LTWSP for a critical drought period.



CAPITAL PROJECTS

Staff continues work on a number of projects to improve the reliability and quality of City water supplies:

- ***Ortega Groundwater Treatment Plant:*** A comprehensive process to identify the optimal treatment scheme was conducted, and a contract for rehabilitation and upgrade of the plant has been awarded, with construction expected to begin early in 2012. The project goal is to maintain availability of an important part of the City's water supply to provide back-up for depleted surface water supplies during drought, meet peak demands, and serve as an emergency water supply in the event of catastrophic supply interruptions.

- ***Advanced Water Treatment Project:*** The project to add ozone treatment facilities at the Cater Water Treatment Plant is underway. A low-interest State Revolving Fund loan has been approved to fund this project as well as the groundwater treatment improvements, well rehabilitation, and distribution system improvements at Reservoir No. 1. These improvements will facilitate distribution of water from low elevations to higher zones as would be necessary during catastrophic water supply interruptions. The ozone project is expected to allow the City to more reliably meet pending water quality regulations.

- ***Recycled Water Treatment Plant Rehabilitation:*** Funding has been appropriated to rehabilitate the recycled water filters. Design of this project will commence now that a secondary treatment process upgrade has been identified to better treat the wastewater to achieve readily filterable water.

WATER SUPPLY ISSUES

There are a number of significant issues related to the City's water supplies, discussed briefly below.

Long-Term Water Supply Program Update: An important accomplishment during 2011 was the Council's adoption of the updated LTWSP. This was the product of numerous technical studies and a year-long collaboration between staff and the Water Commission to appropriately quantify our water supplies and then develop policies that will guide our water supply management of the next twenty years. Following is a summary of some key issues not already addressed above:

- Water Supply Target: A water supply target of 15,400 AFY was adopted, based on estimated normal year demand of 14,000 AFY, plus a 10% safety margin. Given the State mandate for water conservation, this target amount can be expected to be applicable throughout the 20-year period of the plan, as demand from new development is offset by increasing efficiency and use of recycled water.

- Conservation Program: Based on a comprehensive model of our Water Conservation Program, we have identified the cost effective measures that will play a major role in meeting the State mandate. Some are ongoing parts of our current program; others are new, and are being researched for the most effective method of implementation. A survey of City customers has been conducted and a strategic and tactical marketing plan has been developed, with implementation slated for kick-off in 2012. We are evaluating the impact of new State plumbing codes on our efficiency goal with respect to savings potential from new requirements for high efficiency toilets, urinals, showerheads, and faucets.

- Recycled Water: The new plan includes adding 300 AFY of new demand on the recycled water system to offset expensive potable supplies and developing a plan to phase out the use of potable water for blending to meet water quality targets.

- Desalination: The desalination plant remains a part of our water supply for use in catastrophic drought. At the same time, the plan includes identifying more cost effective alternative drought supplies, including water banking and purchase of non-project water through the State Water Project, for the critical drought period. A contract for banked storage has been developed by CCWA, by which members can store surplus carryover water in a Central Valley groundwater basin for delivery up to ten years later for use during drought.

- Drought Response Measures: The new plan is based on 100% deliveries in most years and identifies extraordinary demand reductions of up to 15% as part of our response to the occasional critical drought period. This is up from 10% under the previous plan, but significantly less than the 50% reductions being sought during 1991. We now plan for a six-year critical drought period, compared to five years previously, to reflect the uncertainty of water supplies and the potential impacts of climate change.

- Sedimentation Management: Reservoirs in our area are subject to ongoing loss of volume and yield as a result of sedimentation. The plan calls for a long-term strategy to cost effectively manage sedimentation at Gibraltar Reservoir and, in conjunction with appropriate State and Federal agencies and other project members, at Lake Cachuma as well.

The updated plan is available to the public on the City's website at the following address:
http://www.santabarbaraca.gov/Resident/Water/Rates/Documents.htm

Cachuma Project Water Rights Hearing: The Bureau of Reclamation (Reclamation) and the members of the Cachuma Project continue to await a decision by the State Water Resources Control Board (SWRCB) following a major hearing on the Cachuma Project's water rights completed in November 2003. This was a continuation of SWRCB's long-standing review of the Cachuma Project operations in terms of its effects on downstream water users and on public trust resources (steelhead trout). A December 2002 settlement agreement resolved a number of issues among several of the participants in the hearing, and is under consideration by the SWRCB. The SWRCB ruling has been repeatedly delayed pending completion of the necessary environmental documents. After several drafts, the Final EIR for Cachuma operations has been completed and its released is expected soon, with a possible hearing to follow in early 2012. While this would be an important milestone, it may still be another year before a final decision is issued. The SWRCB decision is important to the City because it could affect the amount of water available from Cachuma for water supply purposes.

Gibraltar Pass Through Operations: The Zaca Fire burned approximately 60% of the Gibraltar Reservoir watershed, normally the source of about 35% of the City's water supply. On top of historical siltation, the reservoir's storage capacity has now been reduced by an additional 1,535 AF, leaving a storage volume of 5,250 AF. In 1989, the City entered into the Upper Santa Ynez River Operations Agreement (the "Pass Through Agreement") with other members of the Cachuma Project. The City agreed to defer its planned enlargement of Gibraltar Reservoir in exchange for provisions that would allow the City to "pass through" a portion of its Gibraltar water to Lake Cachuma for delivery through Cachuma Project facilities. The City has elected to commence this phase of operations and is working with the U.S. Bureau of Reclamation to negotiate a "Warren Act" contract, as required by federal law to allow such use of the Cachuma Project. Modeling work to assess the effects of Pass Through operations has been completed. A draft technical memorandum is being finalized for use during environmental review. The Pass Through option will allow the City to stabilize its Gibraltar deliveries as the reservoir continues to silt in.

State Water Project/Delta Smelt-Wanger Decision: The Sacramento-San Joaquin Delta is the source of all water moved to the south by the State Water Project. There is substantial debate about the relative importance of water supply and environmental benefits in regard to how the Delta is managed. The current approach is that these two co-equal goals need to be acknowledged as a part of any solution.

Delivery allocations are forecasted as a percentage of each member's maximum delivery amount (referred to as "Table A" amount). Beginning in 2007, a number of federal court

decisions impacted diversions from the Delta, meaning a reduction in the delivery allocations for State Project members. At the same time the state was experiencing a prolonged dry period. More recently, there has been some easing of those restrictions and State Water supplies are also more plentiful due to a very wet year in 2011, during which 80% of Table A amounts were available. The City relies on State Water to a limited extent, but it can be an important source of water for banking as a part of increasing the reliability of our water supply.

Appendix A – Supplemental Water Supply Information

Groundwater Balance

Project conditions of the State Water Project (SWP) require the City to use SWP water to offset any demonstrated groundwater basin overdraft. Under the LTWSP, the City uses groundwater conjunctively with surface supplies, such that significant groundwater use only occurs when surface supplies are reduced. Basins are rested following periods of heavy pumping to allow water levels to recover. As summarized in Table A-1, the perennial yield exceeds average annual pumping and groundwater basins are in long-term balance with no overdraft projected. More detailed analysis is available in the LTWSP.

Table A-1. Groundwater Balance

Estimated Perennial Groundwater Yield of 3 Groundwater Storage Units:	1,900 AFY
Approximate Pumping by Private Pumpers:	-500 AFY
Net Perennial Yield Available to the City:	1,400 AFY
Average projected City groundwater pumping under LTWSP at target supply of 15,400 AFY:	1,083 AFY
Groundwater Production in 2010-2011:	506 AF

Projection of Supply Availability

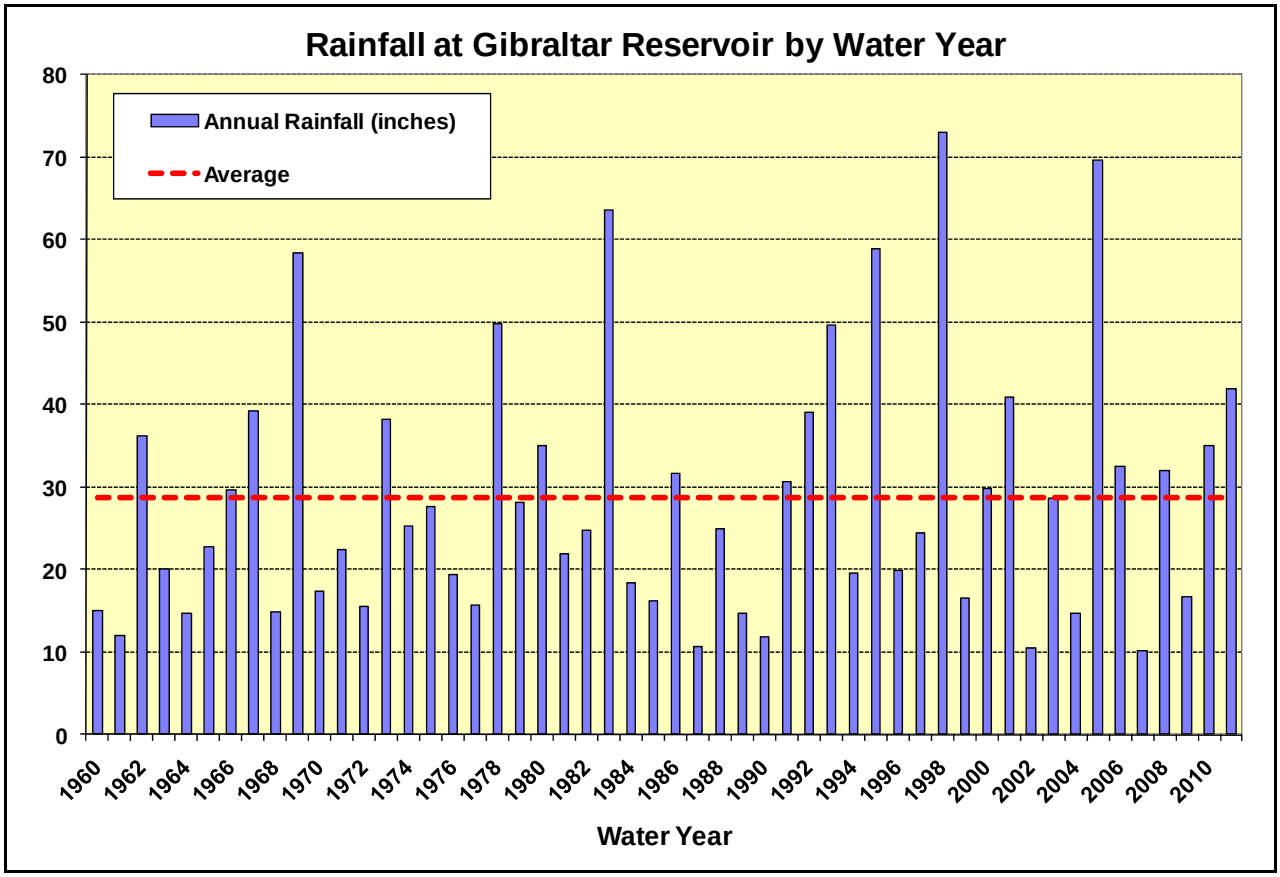
Table A-2 summarizes the City's water supply sources and fulfills a requirement of the project conditions for the SWP. The projected 2011-2011 Supply Plan reflects a projected total demand of 14,000 AF.

Table A-2. Sources of Supply (AF)

Source of Supply	WY 2011 Original Plan	WY 2011 Actual	WY 2011 Supply Plan Projected
Gibraltar Reservoir	3,413	1,987	3,412
Cachuma Project	6,732	8,911	7,582
Mission Tunnel	1,200	1,342	1,100
Devil's Canyon	(w/ Gibraltar)	184	(w/ Gibraltar)
Juncal Res. (300 AF from MWD)	(w/ Cachuma)	(w/ Cachuma)	(w/ Cachuma)
State Water Project	650	750	650
Groundwater	1,206	506	1,206
Desalination	0	0	0
Recycled Water	800	648	800
Net Other Supplies[1]	(na)	-977	-750
Total Production:	14,000	13,351	14,000
Total Demand:	14,000	13,351	14,000
Percent Shortage:	0	0	0

[1] Represents miscellaneous production sources (positive values) and water used from the distribution system for purposes such as transfers to adjacent water purveyors, groundwater recharge, or blending with recycled water (negative values).

Long-Term Rainfall Data



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Local Groundwater Assistance Grant Application
Status of Groundwater Management Plan

2011 Long-Term Water Supply Program

City of Santa Barbara
Long-Term Water Supply Plan
2011

Prepared by Water Resources Division,
Public Works Department

Adopted by the Santa Barbara City Council on June 14, 2011,
as Agenda Item No. 15

City Council:

Helene Schneider, Mayor
Grant House, Councilmember
Dale Francisco, Councilmember
Frank Hotchkiss, Councilmember
Michael Kathleen Self, Councilmember
Harwood “Bendy” White, Councilmember
Randy Rowse, Councilmember

Board of Water Commissioners:

Landon Neustadt, Chair
Barry Keller, Vice-Chair
Russell Ruiz, Commissioner
James Smith, Commissioner
Bill Thomas, Commissioner

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City of Santa Barbara

Long-Term Water Supply Plan
2011

Introduction

The City of Santa Barbara provides water service to most properties within the City limits, as well as several unincorporated areas, including Mission Canyon and the Barker Pass. The service area is approximately 20 square miles with a population of approximately 91,416. The water utility is administered by the Water Resources Division of the Public Works Department. The City's potable water supply sources include surface water from Gibraltar Reservoir, Devils Canyon Creek, and Lake Cachuma; groundwater from City production wells and Mission Tunnel infiltration; State Water; and desalination. A separate recycled water system supplies treated wastewater, primarily for irrigation, to offset the need to use potable water. In addition, water conservation is a key component of water supply management due to its role in offsetting the need to develop new water supplies and reducing the demand on existing water supplies. The Water Fund budget for FY 2011 includes an Operating Budget of $31,301,242 and a Capital Program of $3,349,702, for a total budget of $34,650,944.

For the past 17 years, the water supply has been managed under the 1994 Long-Term Water Supply Program (1994 LTWSP). Important events at the time of the program's adoption included the recent end of the severe drought of 1987 to 1991, an extensive inventory and analysis of water supply alternatives, and the addition of recycled water, State Water, and desalination to the City's water supply portfolio. The program incorporated water demand estimates derived from the City's 1988 General Plan Update process and water conservation savings anticipated from a rapidly developing City Water Conservation Program. During the two decades since the drought, the City's normal year water system demand (including potable and recycled water demand) has dropped from a pre-drought amount of 16,300 AFY to 14,000 AFY, despite a population increase of approximately 5%. This is a significant consideration in the development of this updated plan and is discussed in detail in later sections.

The fundamental challenge for the City's water supply continues to be the ability to provide adequate water during an extended drought. However, the water supply situation may also be affected by potential climate change impacts on hydrology and sea level, new constraints on deliveries of State Water through the Sacramento-San Joaquin Delta, a statewide water supply deficit with an accompanying legislative mandate for water use reduction, new technologies and practices for conserving water, and increasing costs for water supply and operation of the water system.

The City has recently certified an Environmental Impact Report (EIR) for the *Plan Santa Barbara* process to update the City's General Plan. The document included an analysis

of the City's water supply, which was developed in conjunction with the City's Water Commission in preparation for a recommendation to update the 1994 LTWSP. On June 14, 2011, the City Council adopted this Long-Term Water Supply Plan as Agenda Item No. 15.

Terms and Concepts

A number of key terms and concepts play a role in water supply planning and are discussed below:

Planning Period: The period covered by this plan is from 2011 through 2030, intended to roughly correspond with the term of the anticipated General Plan update.

Water Production: Production is the amount of water treated and put into the City distribution system in order to serve City water customers, net of deductions for water that leaves the distribution system as transfers for other purposes. As such, production is a measure of the amount of water supply needed to serve City customers. Production is tracked separately for the potable and recycled distribution systems. The sum of these two is referred to as "system production."

Metered Sales: The City maintains 26,513 retail water meters that measure the water used from the distribution system by City water customers. The sum of usage on these meters is referred to as "metered sales." Due to system losses, distribution system flushing, and normal meter inaccuracy, this number is generally about 90% to 92% of the production amount.

Cloud Seeding: Clouds can be seeded with certain compounds that enhance the amount of precipitation generated. The City participates, with other Santa Barbara County agencies, in an annual cloud seeding program to augment precipitation and runoff into local reservoirs.

Marginal Cost: To evaluate the economic benefits of ordering more water from one supply over another, only those costs that vary with the amount of water delivered are considered. These are called the "marginal" costs, also referred to as "variable" costs. Fixed or "sunk" costs are not included since they are the same regardless of whether more water is taken from a given source. For example, State Water has substantial costs for debt service and fixed operation and maintenance, but it is only the variable costs for chemicals and electricity that influence the economics of ordering additional State Water.

Avoided Cost: The cost effectiveness of a water conservation measure is evaluated by comparing the cost of the measure to the marginal cost that is avoided as a result of implementing the conservation measure and reducing the amount of water supply required.

Critical Drought Period: A water supply is evaluated by how well it performs in meeting the target level of demand during the expected worst case water supply situation. For the Santa Barbara area, this worst case is an extended drought, characterized by multiple years of below average rainfall, resulting in minimal inflow to Lake Cachuma and declining reservoir levels. The historical critical drought period for Santa Barbara is the 5-year period of 1947 to 1951. The most recent drought of 1987-1991 was somewhat less severe. Importantly, any year following the filling and spilling of Lake Cachuma could be the first year of a critical drought period, but this generally doesn't become apparent until about the third year.

Conservation: The City's Water Conservation Program promotes ongoing efforts to improve water efficiency and reduce waste in ways that don't require lifestyle sacrifices on the part of customers. Examples include using a high efficiency clothes washer to do the job with less water, fixing leaks, replacing a conventional irrigation controller with a smart irrigation controller, and replacing lawn with water wise plants. This type of conservation can be counted on for long-term reduction in demand, which avoids the need to procure more water supplies with high marginal cost. For water supply planning, it is important to distinguish between these ongoing efforts, and planned short-term extraordinary demand reductions employed during an extended severe drought or other catastrophic water supply interruption.

Safety Margin: In addition to quantifiable estimates of water supply yield and projected water demand, there is the potential for unplanned and unquantifiable shortages in supply or increases in demand. The approach used in this plan is to make reasoned estimates of supply and demand for the planning period and then add a safety margin on top of the projected demand target to recognize that unexpected events will occur.

Planned Demand Reductions During Severe Drought: A water supply can be planned for 100% reliability (i.e., able to meet full demand under all circumstances). However, meeting this reliability standard can result in significant additional cost. Because there is short-term flexibility in water demand during extraordinary conditions, it is reasonable to count on such short-term reductions to some extent to reduce the cost of operating the water system. During the most recent severe drought of 1987-1991, it became necessary to seek extraordinary reductions of up to 50%, which came at some considerable expense to the community. This level of planned reduction was deemed excessive during the development of the 1994 LTWSP and an amount equal to 10% of target demand was adopted at that time. This percentage was referred to as the "acceptable shortage" in the 1994 LTWSP.

Water Supply Performance: A water supply plan is evaluated by whether it meets the established technical and policy goals during the planning period. Performance of the water supply is based on assumptions for anticipated deliveries from the various sources. For the City's plan, much of this information comes from the Santa Ynez River Hydrology Model (SYRHM), a computer model developed by the Santa Barbara County Water Agency. The model covers a 76-year period from 1918 to 1993. It uses historical weather and river flow data, along with current water supply facilities and

operational strategies, to simulate the long-term yield of the river in its current state. The purpose is to illustrate how our current water supply portfolio might perform over a future period that is similar to the past. This explains why, for example, the model results include yield from Lake Cachuma in years before the reservoir actually existed.

A second important element of the performance analysis is to evaluate the relative costs of various options for meeting the supply goals. The focus is on marginal costs for the supplies that are part of the various alternatives evaluated.

Current Water Supply Portfolio

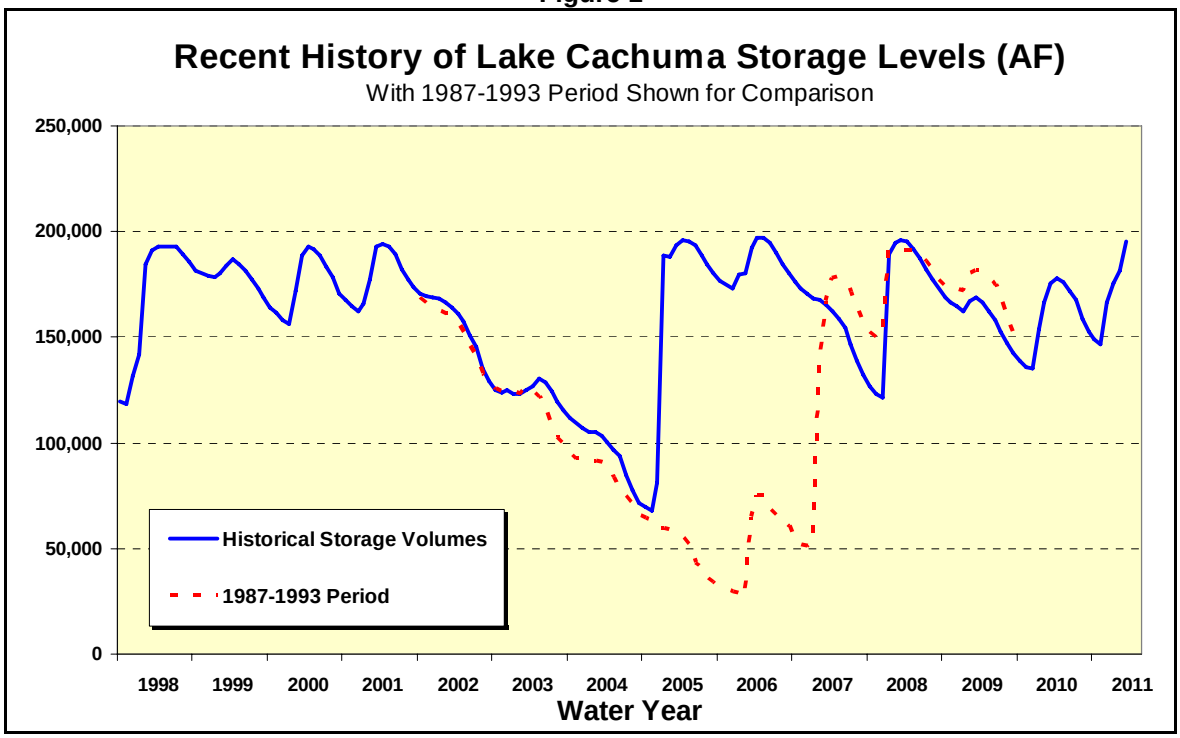
The City operates a diverse water supply. The various supply sources are summarized below. Additional discussion is included in the Final EIR for the *Plan Santa Barbara* process to update the City's General Plan.

Lake Cachuma

The federally-owned Cachuma Project on the Santa Ynez River supplies water to the City and four other member agencies. The most recent capacity survey (2008) estimated the storage capacity at 186,636 AF. The reservoir is currently operated to supply a total yield of 25,714 AFY to the five member agencies in most years. The City's current share of this annual yield is 8,277 AFY. In later years of extended dry periods (characterized by consecutive years of below average rainfall), storage typically drops below 100,000 AF and deliveries to member agencies are reduced. Historically the reservoir has filled and spilled an average of once every three years, but there occasionally are longer dry periods, the longest of which defines the critical drought period for planning purposes. Lake Cachuma is the City's primary water supply and the multi-year storage capacity provides an important buffer against dry periods. Figure 1 illustrates the recent history of storage levels at Lake Cachuma.

The lake is operated by the U.S. Bureau of Reclamation pursuant to orders of the State Water Resources Control Board (SWRCB) and in compliance with a Biological Opinion issued by the U.S. Fish and Wildlife Service (USFWS) for protection of steelhead trout, which were designated as endangered in the Lower Santa Ynez River in 2003. SWRCB is considering Lake Cachuma and Santa Ynez River water rights following a major hearing on the Cachuma Project conducted in November 2003. This was a continuation of SWRCB's long-standing review of the Cachuma Project in terms of its effects on downstream water users and on Public Trust resources (i.e., steelhead trout). The SWRCB ruling has been delayed pending completion of the necessary environmental documents.

Figure 1



For estimating future deliveries from Lake Cachuma during the planning period, the following assumptions were used:

- Alternative 3-C of the 2003 Cachuma Water Rights hearing Draft EIR, as modeled by the SYRHM was assumed. This includes a reservoir surcharge of 3-foot elevation (now in place) to provide additional water for fish releases and operation of the reservoir in compliance with the above mentioned Biological Opinion.

- Siltation has historically averaged about 332 AFY from the time of dam construction in 1953 until the most recent reservoir survey in 2008. Though options to control such siltation will be important, it should be assumed that this rate of siltation will continue, and would result in a 5% reduction in the reservoir capacity, and a roughly similar reduction in yield, by the end of the planning period. As a result, it could be estimated that normal year deliveries would be reduced from the current amount of 8,277 AFY to 7,863 AFY by the year 2030.

- Deliveries of Cachuma water during surplus (spill) conditions are not deducted from member agency annual entitlements, meaning that spill years usually result in some accumulation of water in excess of entitlement. The excess becomes "carryover" water that continues to be available until lost to spill or evaporation. This provides increased flexibility for members, but can not necessarily be expected to increase project yield above the amount modeled. Therefore, delivery estimates do not assume increased yield as a result of the carryover accounting of water accumulated during a spill condition.

Gibraltar Reservoir

In 1920, the City completed construction of Gibraltar Dam on the Santa Ynez River upstream of where Lake Cachuma was subsequently constructed. The dam formed Gibraltar Lake, with an initial storage capacity of 15,793 AF. Water is conveyed from Gibraltar Reservoir to the City through Mission Tunnel. From the beginning, siltation has been an issue, particularly following wildfires. In 1948, siltation had reduced the volume by about half and the dam was raised 23 feet to its current height of 1,400 feet above sea level. Prior to the 2007 Zaca Fire, which burned 60 percent of the Gibraltar watershed, the volume was 6,786 AF. Erosion since the fire, particularly the heavy rainfall of January 2008, has reduced the reservoir volume to 5,251 AF as of the June 2010 lake survey.

Since before the completion of Gibraltar Dam, the City has also diverted water from Devils Canyon Creek just downstream of the dam, with long-term average annual diversions of approximately 100 AFY. The City counts Devils Canyon diversions as part of its total allowable Gibraltar diversions.

As a result of the sale of the Juncal Dam site upstream of Gibraltar Reservoir and associated water rights in the early 1900's, the City receives an annual transfer of 300 AFY from the Montecito Water District. The water is transferred to the City's account at Lake Cachuma.

Current Gibraltar Reservoir operations are based on the 1989 Upper Santa Ynez River Operations Agreement (also known as the "Pass Through Agreement") by which the City agreed to defer a second enlargement of the reservoir in exchange for the right to receive a portion of its Gibraltar water through Lake Cachuma. The intent of this arrangement was to allow the City to stabilize the yield of Gibraltar so it would be consistent with the 1988 reservoir volume, while recognizing the interests of the Cachuma Project and other downstream users.

The City and other signatories to the Pass Through Agreement are currently working to implement the Pass Through mode of the agreement, which tracks the yield of a hypothetical "Base Reservoir" that is equal to the 1988 storage capacity of 8,567 AF, and operated under the procedures defined in the Pass Through Agreement. The Pass Through mode allows Gibraltar Reservoir diversions (including diversions to Mission Tunnel and the portion taken through Cachuma) up to the amount that could have been diverted under the "Base Reservoir" operations. Modeling done in 1989 indicated that long-term average yield of the Base Reservoir would be 5,160 AFY. Yield under the actual Pass Through operations can be expected to be somewhat less on average, due to potential losses associated with conveyance of water between Gibraltar and Cachuma, and spill and evaporation of Pass Through water at Cachuma.

Mission Tunnel

Mission Tunnel conveys water from Gibraltar Reservoir through the Santa Ynez Mountains to the City and was completed in 1910. Infiltration into the tunnel from watersheds on both sides of the mountains contributes to the City's water supply. Water supplies from infiltration to Mission Tunnel have varied from a low of 500 AFY in 1951 to a high of 2,375 AFY, with an average annual yield of 1,125 AFY based on analysis in the DEIR for the Cachuma Project water rights hearings.

State Water Project

The City is a participant in the State Water Project (SWP). Deliveries to Santa Barbara County participants are administered by the Central Coast Water Authority (CCWA). Project water is delivered into Lake Cachuma through the Coastal Branch of the State Aqueduct and two locally-operated pipeline extensions. The SWP contract defines the maximum amount each project contractor is entitled to request each year, which is referred to as the "Table A" amount, referring to the table of that name in the contract. The City's SWP Table A amount is 3,300 AFY and the City has a share of pipeline capacity to deliver that amount. However, deliveries of Table A amounts are subject to availability and delivery constraints.

The California Department of Water Resources produces the State Water Delivery Reliability Report every two years to assist project participants in estimating anticipated deliveries. The 2009 version (published August 2010) is the most recent. The report is based on analysis using the CALSIM II computer model developed by DWR and USBR to simulate Delta flows and predict available deliveries.

Deliveries are estimated for "current conditions" (2009) and "future conditions" (2029). Projections for this plan are based on the "future" conditions, but it is important to note that "future" conditions do not assume improvements in the ability to deliver water through the Delta. Key assumptions are listed below:

- Despite substantial efforts being made to address Delta delivery constraints, DWR's modeling assumes no improvements to the current conveyance system through the Delta. For example, there is no assumption that a Peripheral Canal or other form of "isolated facility" to convey water around or under the Delta will be in place.

- The beneficial effects of planned increases in SWP reservoir capacity are not assumed as a part of the analysis.

- Current constraints on exports, including federal biological opinions of December 2008 (Delta smelt) and June 2009 (salmon, steelhead, green sturgeon, and killer whale) are assumed to remain in place.

- The model does not assume any easing of delivery constraints associated with potential habitat improvements related to the ongoing development of the Delta Habitat Conservation and Conveyance Program, which targets the co-equal goals of ecosystem restoration and water supply conveyance.

- The model has been modified to include the projected future hydrological effects of climate change. The most important of these effects are the assumed continuation of sea level rise and a reduction in the amount of precipitation that falls as snow. The latter reduces the "storage" effect provided by snowpack and results in more concentrated runoff during winter and early spring, versus late spring and summer, which has the effect of reducing the amount of water available for delivery to SWP contractors.

Based on the above assumptions for future conditions, the 2009 report projects 6-year average annual dry period deliveries of 32% to 36% of Table A amount, median deliveries of 63%, and long-term average annual deliveries of 60%. The estimated long-term average continues a downward trend in DWR's previous biennial reports, as shown in Figure 2, reflecting the restrictions of the biological opinions and the projected effects of climate change. Given the number of variables associated with State Water Project deliveries, staff analysis for this plan assumes annual deliveries would be limited in all years to no more than 50% of Table A amounts, reflecting experience during 2008 and 2009. This results in an average annual predicted delivery of 46% of Table A amount (also shown in Figure 2).

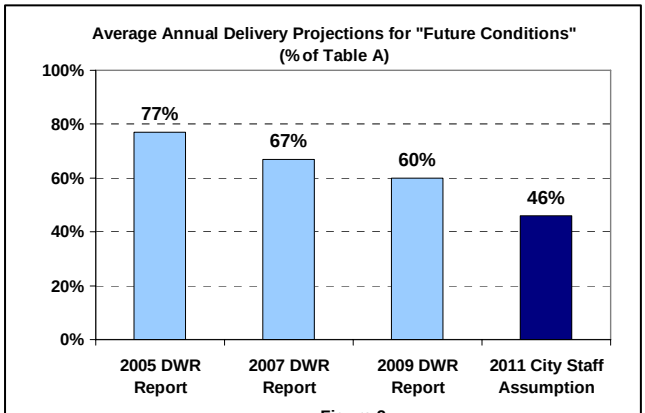


Figure 2

For comparison purposes, actual Table A availability for the past 5 years is shown in Figure 3. This period of 2005 to 2010 includes the recent statewide drought. Three of the five years were classified as "dry" or "critically dry." The period also includes significant new restrictions in SWP deliveries due to environmental and endangered species issues. The 57% average delivery amount for this period suggests that the assumption of 46% average annual deliveries is reasonably conservative.

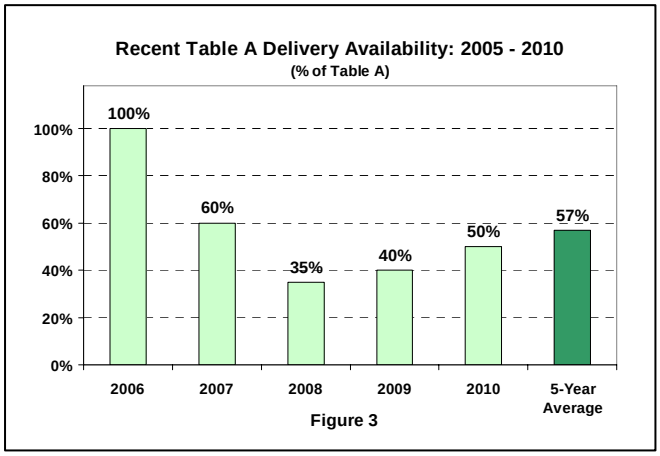


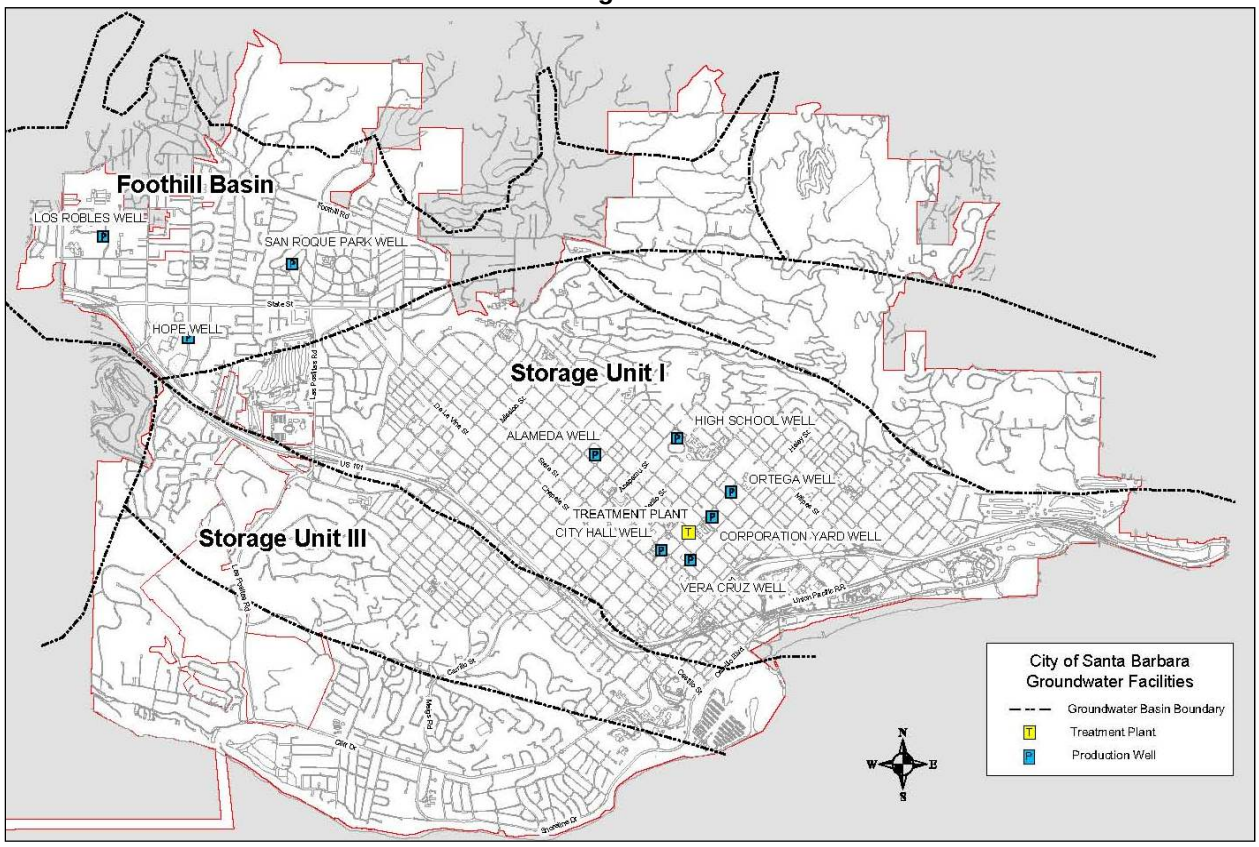
Figure 3

An additional important consideration is the ability of the SWP pipeline to convey non-project water to augment drought year supplies. These potential supplemental water supplies include the State's Dry Weather Water Purchase Program, purchase of unused Table A water available through San Luis Obispo County, or other open market water purchases, such as purchase of agricultural water.

Groundwater

City groundwater supplies are produced from two basins: Storage Unit No. 1 (downtown area) and the Foothill Basin (outer State Street area) as shown in Figure 4. The City conjunctively manages groundwater supplies, withdrawing water when needed and allowing recharge to occur following drought periods. A primary goal of this program is to attempt to utilize the perennial yield of the groundwater basins, while also managing the basins to maximize available storage to act as a back-up supply during drought periods.

Figure 4



The estimated long-term safe yield of these two basins is approximately 1,800 AFY. Extraction by private pumpers is estimated at 500 AFY. The City has six production wells in Storage Unit No. 1 and three in the Foothill Basin, though the wells are in need of varying degrees of maintenance or replacement. While the estimated total pumping capacity is approximately 4,500 AFY, a capacity of 4,150 AFY is assumed for planning

purposes. The total usable storage capacity of these two basins is estimated at 16,000 AF of City pumping. A third basin (Storage Unit No. 3 in the Las Positas Valley area) provides additional safe yield of approximately 100 AFY, but water quality is inferior and is not planned for use.

Seawater intrusion into Storage Unit No. 1 is a key issue because the groundwater basin is in contact with seawater that can flow into the basin during periods of heavy pumping. Under normal periods of little or no pumping, the groundwater flow is toward the ocean, which stops intrusion and pushes the seawater interface seaward. The City's Multiple Objective Optimization Model (developed by USGS) was used to estimate pumping levels that represent a compromise between maximizing production and minimizing seawater intrusion. The model results in total pumping of up to about 17,800 AF during the drought period, allowing some intrusion for the last portion of the drought. It should be noted that this modeling was based on one additional well in each basin, which may have implications for future capital program needs. In Storage Unit No. 1, the assumption was that new wells would be placed further inland to minimize intrusion.

Recycled Water

Recycled water is used in the City to irrigate over 400 acres of landscaped areas (including schools, parks, the zoo, and golf courses) and for toilet flushing in some public restrooms. The City system as currently configured has the capacity to treat and deliver approximately 1,400 acre-feet per year (AFY) of recycled water. Current connected recycled water demand is approximately 800 AFY, plus approximately 300 AFY process water used at the wastewater treatment plant, leaving about 300 AFY of additional capacity.

To meet a City goal of no more than 300 mg/L of chloride during irrigation season, approximately 300 AFY of potable water has historically been blended into the recycled water. This is because blending is the least costly solution and potable water is currently available for this use. A ten-year history of blend amounts is shown in Figure 5.

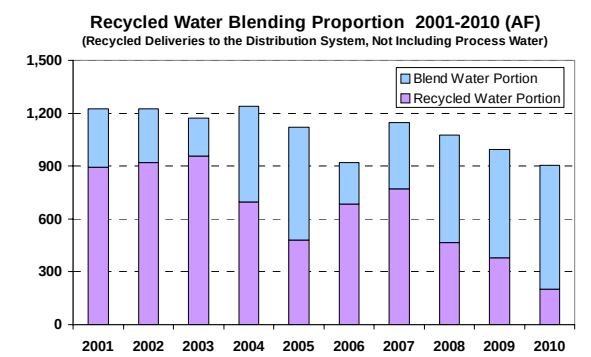


Figure 5

Secondary Process Issues: Beginning in 2004, due to challenges with the secondary treatment process, blending has increased recently to approximately 700 AFY to meet regulatory requirements. Improvements to the secondary process are being evaluated to address this recent increased use of potable water for blending. Once the secondary process is resolved, it is expected that the blend water component can be reduced.

Further Mineral Reduction: Mineral content suitable for irrigation purposes is an important part of fully utilizing the City's recycled water capacity and a standard other than the 300 mg/L chloride limit has been considered. Carollo Engineers identified an Environmental Protection Agency guideline of 1,000 mg/L of total dissolved solids (TDS) as a possible updated standard. A Carollo Engineers study on the recycled water filter rehabilitation project identified a conceptual project to meet this target without the need for blending. For a production rate of 1,910 AFY, the demineralization component was estimated to have a capital cost of $4.6 million. Annualized costs were estimated at approximately $652,000 (including the capital component) resulting in added unit cost of $341/AF of produced recycled distribution water. A blending alternative to meet the same standard is estimated to resulting in added unit cost of about $180/AF of produced water, assuming a cost of $600/AF for potable blend water. A modified blending alternative could involve blending only during the primary irrigation season, as is currently conducted to meet the chloride standard.

The recycled water system provides an important component of the City water supply, even with a partial potable water component for blending. In addition, the fact that users are signed up and connected to the separate recycled water system provides increased flexibility in how the City balances the economic and water supply aspects of this source of water.

Desalination

The Charles Meyer Desalination Facility was built in 1991 at an original capacity of 7,500 AFY and has a maximum hydraulic capacity of 10,000 AFY. Sale of a portion of this facility reduced current production capacity to a maximum of 3,125 AFY, which is also the capacity identified in the environmental analysis and permitting to convert the facility to permanent status in 1996. Due to reduced demand and relatively wet weather since 1992, the facility has been kept in long-term storage mode. However, the facility is permitted as a permanent part of the City water supply under a Coastal Development Permit approved by the City and the Coastal Commission. The City's current Regional Water Quality Control Board National Pollutant Discharge Elimination System (NPDES) permit for discharge from the City's wastewater treatment plant includes provisions for discharge of brine when the desalination facility is in operation.

The construction and operation of the Desalination Facility was approved by City voters in an advisory election held in 1991. No major technical barriers have been identified that would prevent reactivation of this facility to produce 3,125 AFY if needed. Although permit requirements would be subject to review by various regulatory agencies, the City has approval of all major permits required to operate this facility.

Reactivation of the facility at a capacity of 3,125 AFY was estimated by Carollo Engineers to cost $17.7 million. (An additional $2.5 million in distribution system improvements that would be required to operate the facility are already planned for construction due to their value in improving overall distribution of water throughout the

system). Operating costs are estimated to be $1,470 per AF, compared to variable costs of about $100 to $700 for other City water supplies. It should be noted that desalinated water includes a substantial energy component, estimated at 4,615 kilowatt-hours (kWh) per AF of produced water. This is lower than the original facility's energy use of 6,600 kWh per AF, but still well in excess of the energy requirements for other City water supplies. Should the need arise, reactivation is estimated to require about 16 months from the time of approval of any required permits.

Demand Management

Demand management (i.e., water conservation), provides a viable alternative to the high marginal costs of procuring new water supplies or increased deliveries from the more expensive existing supplies. Projected water demand is a key input assumption of the water supply planning process. Balancing the assumptions of projected water demand with the projected water conservation savings is necessary to develop an accurate water demand forecast. This section reviews the history of the City's water demand, summarizes current water conservation efforts, and discusses recent analysis and regulations that are relevant to the anticipated level of demand during the planning period.

Current Status

The total water system production is used to track the demand for water, since water is produced and put into the distribution system to match customer demand. The history of water demand from 1986 to present is shown in Figure 6 as a moving 12-month average.

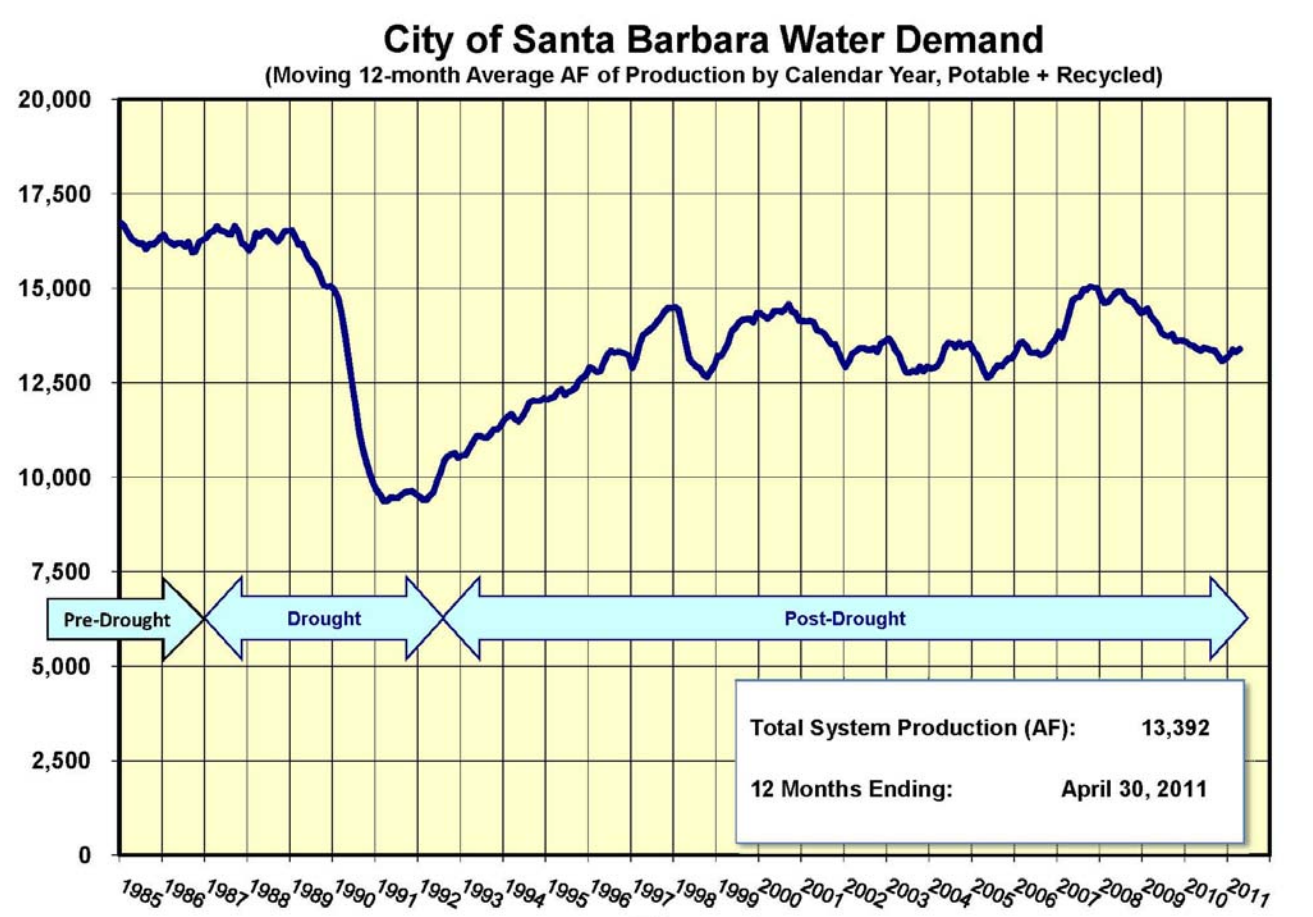


Figure 6

Moderate cutbacks in response to a Stage 1 Drought are evident during 1989 and response to the Drought Emergency is reflected in significant reductions during 1990. From 1992 to 1998, a steady post-drought recovery occurred, followed by a period of generally flat demand, but with significant fluctuations from year to year. To analyze this period of fluctuations, staff began tracking demand in relation to rainfall and evapotranspiration (ETo) data, as shown in Figure 7.

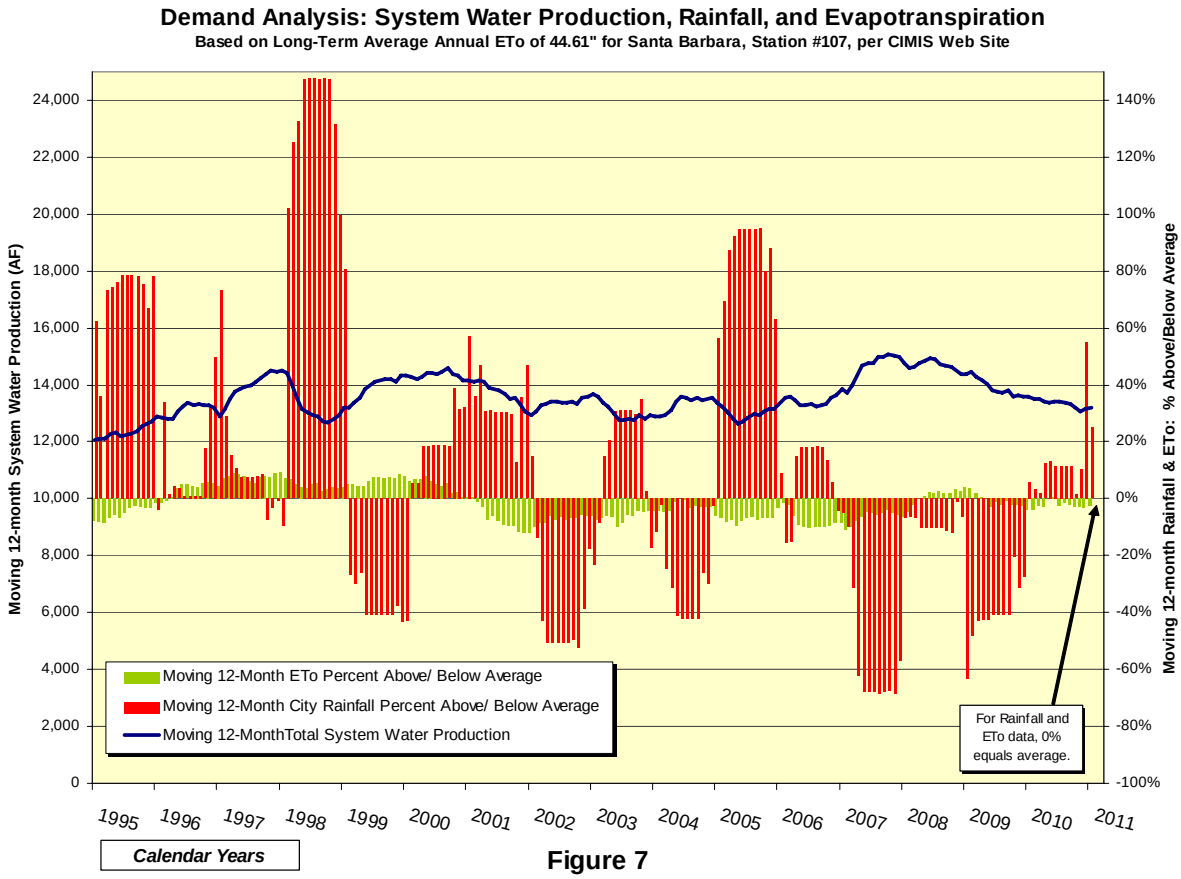


Figure 7

This information suggests that weather based fluctuations are the predominant effect on water demand. It is used to help estimate the "normal year" demand (i.e., approximately average rainfall), as the basis for planning water supply and estimating revenues.

Under the 1994 LTWSP, the City's water supply was planned to meet a total water system demand of 18,200 AFY. This number was derived as 17,900 AFY of demand projected during the 1989 update of the City's General Plan, plus a 10% safety margin, for a total of 19,700 AFY, minus an assumed "supply" of 1,500 AFY from new water conservation (some rounding included). Demand without safety margin for the end of the period was projected to be 16,400 AFY, including the assumed effects of water conservation. As the 1994 LTWSP planning period comes to an end, the normal year

demand is approximately 14,000 AFY, about 2,400 AFY less than projected. Demand for the 2010 water year, with rainfall about 12% above average, was 13,347 AFY.

The significant reduction in current demand compared to pre-drought levels can be attributed to a number of factors:

- An aggressive water conservation program;
- Less actual development than was projected;
- The cumulative effects of stricter plumbing codes and appliance standards on both new and existing development, and
- The relatively high cost of water, accentuated by the block rate pricing structure that charges a higher unit rate for higher levels of water usage.

The City's Water Conservation Program has developed into a comprehensive demand management effort. An important focus of the water conservation program has been to comply with, and to help shape, the Best Management Practices for Urban Water Conservation (BMPs) administered by the California Urban Water Conservation Council (CUWCC). These BMPs constitute the officially recognized standard for urban water conservation. Implementing the BMPs satisfies contractual requirements associated with the Cachuma Project. The BMPs have become a requirement for water utilities to remain eligible for state and federal loans and grants and Urban Water Management Plan acceptance. The City has been a signatory to the CUWCC Memorandum of Understanding Regarding Urban Water Conservation since 1992 and has worked with CUWCC to insure that the BMPs are practical and effective in achieving cost effective conservation savings.

Highlights of the water conservation program include:

- A broad selection of up-to-date print and on-line information on indoor and outdoor water conservation for both homes and businesses, including water wise plant selection, on-line irrigation scheduling tools, sustainable landscaping, high efficiency appliances, and water use awareness;

- Rebates for installation of water wise plants, smart irrigation controllers, and efficient irrigation systems, as well as high efficiency toilets, urinals, and clothes washers;

- A youth education program for elementary and secondary students, including classroom presentations, curriculum, treatment plant tours, and assemblies;

- The Green Gardener program, which trains landscape maintenance professionals in resource efficient and pollution prevention landscape maintenance practices;

- Practical guidelines and ordinances that reflect current technology for water conservation, including the City's Landscape Design Standards for Water Conservation;

- Targeted billing system analysis to reach customers with particularly high water usage, with an emphasis on providing site-specific landscape water budgets and real-time irrigation demand information; and

- A residential and commercial customer assistance program, providing free water check-ups to evaluate all water uses on the property and make recommendations for improved indoor efficiency, water wise plant selections, and irrigation system upgrades.

The current program is outlined in more detail in Appendix A (Water Conservation Program Summary).

City General Plan Growth Policies

Growth policies and projections analyzed for the City's General Plan update process (*Plan Santa Barbara*) were used as the basis for projecting water demand through the end of the planning period. Under proposed General Plan policies, development of up to 2,795 new dwelling units (DU) and 2.0 million square feet of new non-residential development are projected to occur within the City limits by the year 2030. Water demand for these projections is estimated as follows, based on recently updated aggregate demand factors for applicable customer classes:

Single Family Residential:	13% of 2,795 DU = 363 DU X .40 AFY/DU =	145 AFY
Multi-Family Residential:	87% of 2,795 DU = 2,432 DU X .16 AFY/DU =	389 AFY
Non-Residential:	2,000,000 ft^2 X .13 AFY per 1,000 ft^2 =	260 AFY

When 100 AFY of demand from projected added demand outside the current City limits is included (e.g. for annexations to the City), the result is a projected new demand of about 895 AFY. It is important to note that using current aggregate demand factors to project future demand can be expected to overestimate demand for new development. This is because new development will be subject to new codes and standards, while aggregate demand includes a significant portion of the building stock constructed under older standards.

State and Federal Requirements

A number of factors at the State and Federal levels will affect water demand in the future:

CUWCC BMP's: As noted above, the City's ongoing implementation of the BMP's can be expected to continue to exert a downward pressure on water use.

State & Federal Plumbing Codes: Currently, Federal plumbing and appliance efficiency standards require 1.6 gpf toilets, 1.0 gpf urinals, and 2.5 gpm showerheads. Effective 2014, all toilets and urinals sold in California will need to meet the new standards of 1.28 gallons per flush for toilets and 0.5 gallons per flush for urinals. This change will affect demand from new development, as well as demand from existing development as older fixtures are gradually replaced with models meeting the new standards. As required by the legislation, compliant models are already on sale in California at major retail and wholesale outlets. In addition, the California Green Building Standards have recently become effective and now essentially mandate the above standards for new construction. Additionally, after July 1, 2011, the 2010 California Plumbing code will require installations of 1.28 gpf toilets and .5 gpf urinals for all residential occupancy remodels. These include single family residential, dorms, hotels, apartments and basically any structure where overnight sleeping takes place.

S.B. 407 Fixture Replacement: Recent State legislation requires that new building owners be notified if the property does not have high efficiency fixtures. Implementation requirements are still unclear, but this can be expected to further the pace of conversion to high efficiency plumbing fixtures.

California's 20 X 2020 Requirement: In 2008, the Governor initiated a goal of 20% reduction in per capita urban water use by 2020. In 2009, the legislature adopted this goal into law by passing the Water Conservation Act of 2009 (SBx7-7). The penalty for non-compliance is ineligibility for State grants and loans. The focus is on public potable water distribution systems only. As such, the use of recycled water helps toward meeting the requirement. Targets were established by hydrologic regions, with several options for defining the baseline and the eventual 2020 target of per capita water use. The most suitable option for the City is "Method #3" in the legislation. This results in a baseline of 154 gallons per capita per day (GPCD) and a 2020 target of 117 GPCD. The 2009 potable per capita demand for the City was 130 GPCD, as calculated in compliance with the legislation.

Water Conservation Technical Evaluation

In preparing this plan, it was important to evaluate all of the above factors and determine to what extent additional water conservation could be relied upon during the planning period. This is in the context of meeting the State requirements of 20 X 2020

for per capita water use, meeting the CUWCC BMP requirements, and for properly identifying a cost effective role for water conservation in avoiding water supply costs.

Maddaus Water Management (MWM) is an engineering firm that is widely recognized as expert in estimating the costs and benefits of water conservation measures. MWM was hired to analyze the City's existing conservation program and use its proprietary Demand Management Decision Support System (DSS) to model current and potential conservation measures. The DSS also quantified the demand reduction effects of these measures along with the effects of plumbing codes and appliance standards. The process evaluated 92 potential measures which were screened for several factors to identify 23 that are most appropriate for Santa Barbara water customers. These 23 measures were inserted into the model, along with detailed information about the City's customer base and demand history. The project is described in more detail in the Executive Summary of the project report included as Appendix B (Water Conservation Technical Evaluation – Executive Summary). Key findings, including the effect of assumed development consistent with the Plan Santa Barbara process, are as follow:

- The 2030 demand would be expected to increase by 1,202 AFY (compared to the 2006 model reference point of 13,623 AFY) to 14,825 AFY, if the effects of already adopted plumbing codes and appliance standards were <u>not</u> considered. (It should be noted that this is not a projection that will actually occur, but it is a useful reference point to illustrate the ongoing effect of stricter codes and standards on both new and existing development.)

- The effects of the plumbing code and appliance standards are estimated to reduce 2030 demand by 919 AFY, to 13,906 AFY, not including the effects of conservation program activities and measures.

- Conservation Program B, which includes current conservation program measures along with those that together meet a utility benefit-cost ratio of 1.0, is estimated to reduce demand by an additional 498 AFY, to 13,408 AFY.

The benefit-cost ratio was calculated on the basis of an avoided cost of $600 per AF, which is an average of the variable costs associated with State Water Project Table A deliveries, groundwater produced from the Ortega Groundwater Treatment Plant, and deliveries of purchased water through the State Water Project during non-critical drought periods.

Figure 8

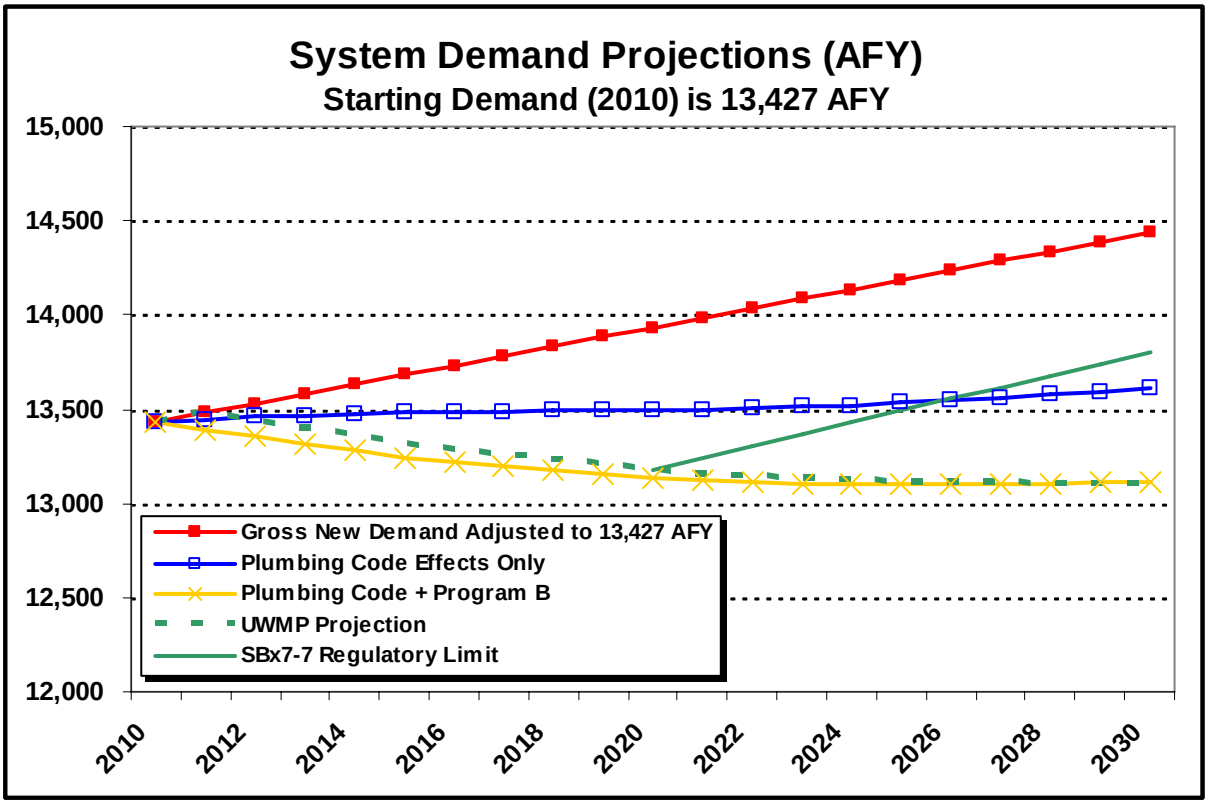


Figure 8 shows demand projections reflecting the various factors that will influence the City's actual water demand over the course of the planning period. These are based on the modeling results from the Maddaus report, adjusted to a reference point equal to the Fiscal Year 2010 total system demand of 13,427 AFY.

Primary Planning Issues

Given the water supply as described above, there are several key issues that shaped the water supply policies contained in this plan, as discussed below.

Planned Duration of Critical Drought Period

The critical drought period for the City's water supply occurs when there are multiple consecutive years of below average rainfall. This is due to the particular hydrology of the Santa Ynez River, where little or no inflow to Lake Cachuma typically occurs until at least average rainfall has occurred. When this condition of average or less rainfall continues for multiple years in succession, the storage level of Lake Cachuma drops and shortages in deliveries occur. Based on historical data, the critical drought period has had a duration of five years.

Climate change has the potential to impact the water supply, though it is still unclear whether this will have a significant effect during the planning period. To the extent information is available for the local area, overall rainfall amounts would be expected to be similar to recent history, but an increasing frequency of extreme rainfall events can be expected. This has the potential to result in an extended irrigation season with some associated increase in demand. From a water supply perspective, more concentrated rainfall events may have the benefit of increased inflow to Lake Cachuma. Guidance from the State planning agencies is that California can expect a 20% increase in both the frequency and the duration of dry periods. For the City's water supply this would suggest a critical drought period frequency of perhaps once every 30 years, instead of 40 years, and a duration of 6 years, instead of 5 years. Even though climate change impact information is incomplete and still undergoing critical review, the six-year drought period is a reasonable test and staff has used it for critical drought period analysis of the water supply.

Role of Desalination

The City's desalination facility is a vital resource as a back-up for potential prolonged drought and unforeseen interruptions of the water supply and would help mitigate the economic impact of such situations. It is also a reliable source of water, once in operation. However, as noted above, reactivation of the facility will result in significant costs, if only for the planning and design work that would be needed to start the process. In recent years, a dry period of only three years has been enough to trigger the start of planning to reactivate the facility in case of continuing dry weather. In 2004, after three years of drought, the storage level at Lake Cachuma had been reduced to about 70,000 AF out of 190,000 AF (37% of capacity) and the City was beginning this process of planning for reactivation.

As a result of discussion of this issue between staff and the Water Commission, the water supply has been modeled to stretch available Cachuma supplies over a potential 6-year drought period, with the goal of deferring the reactivation process, i.e. to plan for operation in the sixth year of a critical drought period instead of the fifth year. This would reduce the frequency of the planning and design effort, as well as reducing the likelihood that the substantial expense of actually reactivating the facility would be needed. This is another basis for the six-year critical drought period used in performance modeling.

Sedimentation Management at Reservoirs

Reservoirs on the Santa Ynez River are vulnerable to loss of storage capacity due to siltation, as are reservoirs throughout the west. Reduced storage capacity reduces the yield of a reservoir. At Gibraltar Reservoir, efforts to maintain storage capacity by dredging have had marginal impact and high cost. There has been some interest on the part of federal agencies to cooperate in vegetation management using controlled burns, but budget issues have made this unlikely to occur. Implementation of the Pass

Through provisions of the Upper Santa Ynez River Operations Agreement will essentially stabilize Gibraltar deliveries at a level close to historical amounts, despite continuing sedimentation. Still, an updated analysis of potential alternatives for managing sediment will be useful.

Efforts to control sedimentation at Lake Cachuma will require a joint effort among the Cachuma Project members, the downstream water users, and the various state and federal agencies that would have responsibility for permitting and/or implementing measures to address siltation. Issues related to such efforts are likely to be shared with numerous other reservoirs throughout the state, meaning that a coordinated statewide effort may be appropriate.

Groundwater Management

The City has initiated a three-year USGS study to update the groundwater flow and water quality models to allow more accurate management of groundwater. Better indicators of basin fullness are expected to be developed. More importantly, the modeling of seawater intrusion effects in Storage Unit No. 1 is expected to be made more accurate. This will guide placement of new wells in the basin, assist with scheduling well operation to minimize intrusion, and provide the ability to estimate the benefits of groundwater recharge for basin replenishment and creating barriers to seawater intrusion. In addition, the City should formalize its groundwater management role by developing a Groundwater Management Plan in accordance with State regulations.

Recycled Water Expansion

Recycled water is a relatively expensive source of water, but it is a reliable way to extend potable water supplies, thereby deferring the expense of procuring additional potable supplies. Additionally, increased recycled water connections will allow flexibility in meeting regulatory demand management requirements, such as the statewide requirement to reduce gross daily per capita water consumption. Current recycled water system capacity is 1,400 AFY, and current demand includes 800 AFY of retail demand and about 300 AFY of process water at EEWTP, for a total of 1,100 AFY. Carollo Engineers identified about 300 AFY of potential new users of recycled water, some adjacent to the existing system and some that could be served with extensions of the distribution system. These opportunities are being evaluated for their potential to cost effectively improve the reliability of the City's water supply and aid in meeting the state mandate on per capita water use. A caveat is that such expanded use will be more difficult to achieve if the mineral content is not reduced below that of the raw wastewater that feeds the recycled water system.

Water Supply Performance

The charts included as Appendix C are based on a worksheet developed by staff to simulate the City's water supply using the long-term model results from the Santa Ynez River Hydrology Model and other delivery assumptions as described above. An additional hypothetical year was added at the end of the 1947-1951 drought to simulate the 6-year critical drought period. For this sixth year, deliveries from Gibraltar, Mission Tunnel, and SWP are assumed to be the average of the preceding five years of drought. Cachuma is assumed to have negligible inflow during year six and the 5-year modeled yield is stretched out over the 6-year period. The charts illustrate how the City's water supplies would be used in the most cost effective manner to meet the projected demand during varying water supply conditions, ranging from very wet to very dry. The worksheet was used to explore the potential to defer the use of desalination at least until the sixth year of a drought. Three conditions are represented:

- The first represents "Current Conditions", with Cachuma entitlement of 8,277 AFY and no use of the safety margin.
- The second represents the near-term condition with Cachuma entitlement also at 8,277, but with a 10% safety margin included.
- The third represents 2030 conditions, with projected future Cachuma entitlement at 7,863 AFY and 10% safety margin included.

Planned demand reductions during the critical drought period are set at 10% in year 4, 15% in year 5, and 15% in year 6.

The worksheet uses a projected system demand of 14,000 AFY (plus safety margin as specified above), based on the combined effects of new development during the planning period, reductions in water use due to updated plumbing codes and appliance standards, the effects of the City's water conservation program, and the statutory requirement to meet a reduction in per capita daily water use by 2020.

A category called "Drought Supplies" is used to indicate water that would be used defer the use of desalination, either from unused State Water that is banked for use during dry periods or from the purchase of water during the critical drought period. The worksheet estimates that approximately 4,400 AF of unused State Water would be available for banking if contractual arrangements could be made to store the water for future use. Assuming a 50% deduction for the service of banking the water, about 2,200 AF of water would be available to meet the need for drought supplies. Water purchases would be pursued if additional water were needed. The desalination facility is proposed to remain a part of the City's water supply and would be used, if needed, to address shortages remaining after the use of banked water and purchased water.

The worksheet uses supplies as needed to meet the target demand according to the following sequence of priorities:

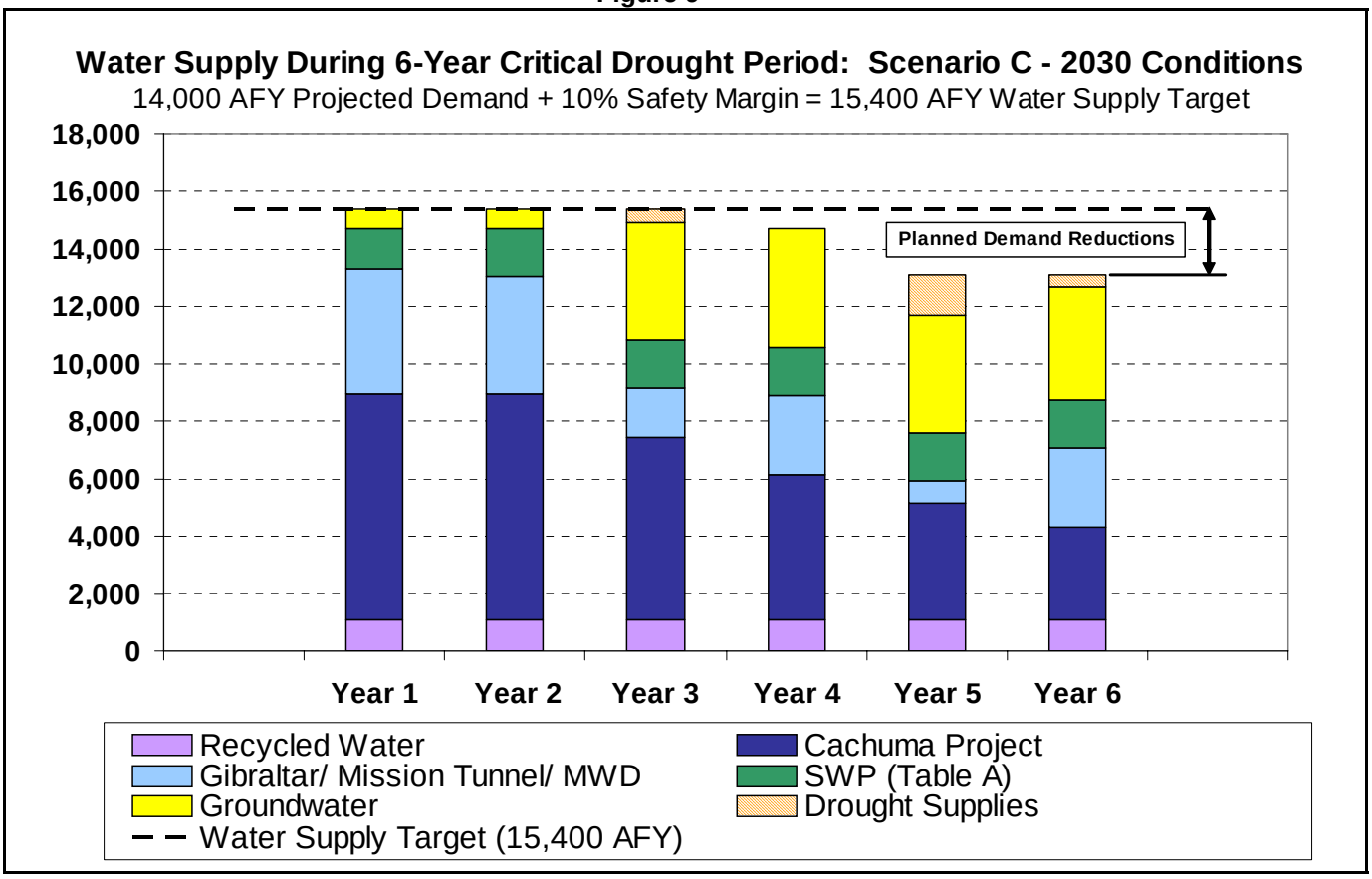
1. All available water from Gibraltar, Mission Tunnel and the Montecito Water District transfer, plus the 1,100 AFY of recycled water;
2. Minimum groundwater usage of 700 AFY;
3. The City's "exchange water" obligation of SWP Table A water (600 AFY);
4. Available Cachuma entitlement (except that remaining SWP Table A water is taken in year 2 and later to preserve available Cachuma water);
5. Remaining available SWP Table A water;
6. Added groundwater pumping up to the maximum amount of 4,150 AFY, subject to a cumulative pumping limit to minimize seawater intrusion;
7. Deliveries of "Drought Supplies" (banked water or purchased water to the extent available) through SWP facilities; and
8. Desalination (if necessary).

The worksheet is set up to take Planned Demand Reductions in years 4, 5, and 6 prior to taking delivery of Drought Supplies. The cumulative drawdown of available groundwater is tracked.

The water supply charts illustrate that the City's water supply can be met in most years with limited groundwater pumping, an average of only about 75% of available State Water, no drought supplies (banked water, purchased water, or desalination), and no need for extraordinary demand reductions. The real test of the water supply is the six-year critical drought period, beginning with model year 1947. Note that the sixth year is a hypothetical year that extends the historical 5-year drought to a 6-year drought. The 6-year critical drought period for 2030 Conditions (Scenario C) is highlighted in Figure 9. Key points illustrated include:

- Years 1 & 2: much like any non-drought year (mostly surface water, plus limited groundwater pumping);
- Year 3: Cachuma deliveries reduced to stretch remaining supplies; maximum groundwater pumping begins; small amount of Drought Supplies required;
- Year 4: First year of Planned Demand Reductions (4% of allowed 10%); further reduction at Cachuma is offset by some increased inflow at Gibraltar; no Drought Supplies required;
- Year 5: 15% Planned Demand Reductions; 1,364 AF of Drought Supplies taken; zero water delivered from Gibraltar; and
- Year 6: 15% Planned Demand Reductions; maximum pumping constrained slightly by the cumulative limit; some Drought Supplies required as a result; rainfall provides water from Gibraltar, but not enough to increase Cachuma deliveries.

Figure 9


Water Supply During 6-Year Critical Drought Period: Scenario C - 2030 Conditions
14,000 AFY Projected Demand + 10% Safety Margin = 15,400 AFY Water Supply Target
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Planned Demand Reductions
Year 1
Year 2
Year 3
Year 4
Year 5
Year 6
Recycled Water
Gibraltar/ Mission Tunnel/ MWD
Groundwater
Water Supply Target (15,400 AFY)
Cachuma Project
SWP (Table A)
Drought Supplies

Water Supply Policies

This plan has been developed to evaluate the adequacy and reliability of the City's water supply and provide a long-term view of how the City's water supplies will be managed. It is based on the best currently available projections and assumptions, and is to be considered a plan, not a prescription. New information or conditions may necessitate adjustments or new policy direction. Based on the information contained and referenced herein, the City's water supply management program will be guided by the following policies:

1. Safety Margin: A safety margin of 10% above projected demand will be used for planning purposes to accommodate unplanned increases in demand or decreases in available supply.

2. Demand Reductions During Drought: Planned short-term reductions of up to 15% in customer demand will be a part of the City's response during a critical drought period. Such reductions will be in addition to the ongoing promotion of long-term water use efficiency and will be achieved by measures such as restrictions on landscape irrigation and other water uses, a modified water rate structure, and intensive public information efforts to promote the community goal of reduced water use. This policy of planned cutbacks is established in recognition of short-term elasticity in customer demand that can be tapped during rare emergency conditions to avoid the cost of 100% reliability of the water supply.

3. Recycled Water: State and City regulations requiring use of recycled water where available will be implemented. Capacity in the City's recycled water system will be utilized to continue to serve existing connected demand plus an additional 300 AFY of expanded use, for a total of approximately 1,100 AFY, in addition to recycled water used for process water. The use of potable water for blending will be tracked and reported annually. A contingency plan for eliminating the need for blending will be developed for implementation based on economic, regulatory or water supply requirements. The City's goal is to be able to deliver recycled water to its customers, without blending, by the end of the planning period. Status of this goal will be reported at five-year intervals as a part of the City's Urban Water Management Plan updates.

4. Water Conservation: The City will operate a water conservation program aimed at minimizing the use of potable water supplies, meeting the requirements of the California Urban Water Conservation Council Best Management Practices, and achieving compliance with 20 X 2020 per capita water use limitations. Conservation measures will be evaluated for cost effectiveness based on avoided cost of additional water supplies.

5. Groundwater Management: Groundwater production capacity of at least 4,125 AFY will be maintained in Storage Unit No. 1 and the Foothill Basin to augment

depleted surface water supplies during a severe drought. Ongoing modeling will assess strategies for groundwater management, including optimal use of available recharge, injection of potable water for artificial recharge, and injection of recycled water as a barrier to sea water intrusion. Sites for new or replacement production wells will be evaluated with the goal of minimizing sea water intrusion. The City will develop a Groundwater Management Plan, consistent with state law, to provide for the orderly and responsible use of the City's groundwater resources.

6. Gibraltar Pass Through Operations: Pass Through operations will be implemented for storage of Gibraltar water in Lake Cachuma, pursuant to the 1989 Upper Santa Ynez Rive Operations Agreement. An updated analysis of sedimentation management will be conducted to assess whether efforts to arrest or reverse the sedimentation process at Gibraltar Reservoir are feasible.

7. Sedimentation Management at Lake Cachuma: To address ongoing reduction in capacity at Lake Cachuma due to sedimentation, the City will promote development of a long-term strategy to minimize sedimentation in conjunction with Cachuma Project Member Units and other appropriate parties and agencies, including state and federal agencies.

8. Water Banking: The City will investigate opportunities to bank unused State Water, with the goal of using this water to reduce the amount of drought water purchases that may be needed during a critical drought period, and deferring the potential need for production from the desalination facility at least until the sixth year of a critical drought period.

9. Desalination Facility: The City's desalination facility is an important component of the City's water supply, despite the significant cost of activating and operating the plant. The desalination facility will be retained as an official part of the City's water supply for use as may be needed during extended drought.

10. Water Supply Reliability: The City will adequately fund the maintenance, rehabilitation, and replacement of the water conveyance and distribution infrastructure to provide reliable delivery of the City's water supplies and prevent increased costs from deferred maintenance. In addition to planning for periodic droughts, the City will develop an emergency water supply plan to address catastrophic interruption of water supplies due to earthquake, South Coast Conduit failure, or other disaster that could interrupt the City's ability to convey water from the Santa Ynez River for a substantial period of time. The groundwater production capacity identified for drought response will also be maintained for response on short notice to such catastrophic interruptions.

11. Management of Water Fund Assets: Land and equipment assets purchased with Water Fund resources will be managed for the purpose of optimizing the economic and sustainable operation of the water system.

12. Monitoring and Reporting: Ongoing monitoring and reporting of the City's water supply status will be conducted, including annual reports to City Council on the near-term drought outlook, preparation of 5-year updates of the City's Urban Water Management Plan, and an update of this plan in approximately 2030, or sooner as may be appropriate.

Finding

Based on implementation of the above policies, the City's water supply is determined to be adequate to serve anticipated demand for the duration of the planning period.

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Appendix A:

City of Santa Barbara
Water Conservation Program

Program Summary

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City of Santa Barbara Public Works Department
Water Resources Division

WATER CONSERVATION PROGRAM SUMMARY
February 2011

The City of Santa Barbara is a long-term leader in water conservation. The City's Water Conservation Program began as a response to the drought in the late 1970's. In 1988, the Water Conservation Program was increased as a result of the recommendations from the City's Five-Year Water Policy Action Plan. As a result of the 1986-1991 California Drought, the City accelerated implementation of the Water Conservation Program.

The City's current Water Conservation Program is a combination of the City's commitment to carrying out the California Urban Water Conservation Council's (CUWCC) Best Management Practices and the City's dedication to water conservation as a element of the City's water supply plan. The City joined the CUWCC in January 1992 as a result of signing the Memorandum of Understanding Regarding Urban Water Conservation. Since that time, the City has been actively carrying out the Best Management Practices. Below is a description of the City's Water Conservation Program.

Foundational BMPs

BMP 1. Utility Operations Programs

BMP 1.1 Utility Operations Practices

1. Conservation Coordinator

The City's Water Conservation Program staff includes the FTE of one Water Resources Specialist, administrative support from one Senior Office Specialist, and 10 hours per week from a temporary Water Resources Technician.

2. Water Waste Prevention

City Ordinance No. 4558, adopted on February 1989, prohibits the waste of water defined as gutter flooding and failure to repair leaks in a timely manner.

BMP 1.2 Water Loss Control

Annually City completes the standard water audit and balance using the AWWA Water Loss software. The City's system unaccounted loss is ~1%. The City implements an annual water main replacement program. Age, material, and break history of water mains are tracked to determine overall condition of main in order to determine the priority of mains to be replaced. The City replaces three miles per year of the 275 miles of main in the distribution system.

BMP 1.3 Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections

City meters all customers and has an inclining block rate structure.

BMP 1.4 Retail Conservation Pricing

City has an inclining block rate structure.

BMP 2. Education Programs

BMP 2.1 Public Information Programs

Water Conservation Hotline. The Hotline handles the incoming calls for the Water Conservation Program. Hotline staff schedule water checkups and provides administrative assistance to the Conservation Program.

Website. The City's Water Conservation Programs website is www.savewatersb.org. Additionally the City promotes the regional water conservation program website, www.sbwater.org.

Water Conservation Brochures and Handouts. Brochures and handouts are distributed both hard copy and via the website on indoor water conservation, efficient irrigation and sustainable landscaping.

Video Loan. Videos on sustainable landscaping, water conservation, efficient irrigation, and water supply are available to the public to loan.

Media Campaign. An annual media campaign is implemented in conjunction with the Santa Barbara County Water Agency and funding from water purveyors countywide.

Water Bill Message. A monthly water conservation message is printed directly on the water bill.

Demonstration Gardens. The Water Conservation Program has two low-water using demonstration gardens, at Alice Keck Park Memorial Garden in conjunction with the Parks Department and the Firescape Garden in conjunction with the Fire Department.

Garden Wise Guys. Garden Wise Guys a thirty-minute television show about designing & maintaining a sustainable landscape. The quarterly show is produced by City TV and funded by the Santa Barbara County Water Agency, the City of Santa Barbara Public Works Department, and the Goleta Water District. It is hosted by two local landscape architects: Owen Dell and Billy Goodnick. With a unique sense of humor, the Garden Wise Guys will give viewers the basic information they need to start making changes in their own yard.

Water Wise Gardening for Santa Barbara County CD and Website.
A free "tool" for water wise gardening —a compact disc and website of gardening information tailored to our climate and our need for water conservation, titled "Water Wise Gardening in SB County". Available on CD or online at www.savewatersb.org or www.sbwater.org, it includes: extensive database with searchable information on over 1,000 water wise plants; more than 300 photos grouped into garden tours and garden galleries, all from local gardens Countywide; helpful facts, resources, and guidance on gardening design and practices; and links to other useful sustainable gardening sites.

BMP 2.2 School Education Programs
Water education presentations are given in approximately 90 classes and summer camps per year. Water education materials are provided to schools. Tours of the City's water treatment facilities with free bus transportation are provided. The City participates in the Annual Water Awareness High School Video Contest.

Programmatic BMPS

BMP 3. Residential

Residential Assistance Program
The City's Water Resources Specialist conducts residential water surveys (water checkups) upon request by water customers. A water checkup includes evaluating all water uses on the property including, and providing recommendations to the customer for improved efficiency including both indoor usage, evaluating irrigation system, and specific recommendations on improvements and upgrades.

Landscape Water Survey
As an element of the water checkups staff performs site-specific landscape water surveys that include checking the irrigation system for maintenance and repairs, reviewing the irrigation schedule and making recommendations for adjusting program of irrigation controller, providing customer with evaluation results and water savings recommendations.

The City has conducted an average of 400 water checkups per year for a total of 9,290 surveys since June 1990 (this includes both residential and commercial water checkups.) Savings for this program is projected to be 400 AFY for the 20 year period as projected in the LTWSP.

Smart Rebates Program
The Smart Rebates Program is co-funded through Proposition 50 grant received by the California Urban Water Conservation Council (CUWCC) and participating water suppliers throughout California. The Program provides rebates for water users to improve their efficiency through appliance and equipment retrofits and replacements. The City is participating with water broom (high efficiency pavement washers) rebates at $50 each, high efficiency clothes washer rebates at $150 for residential customers, and $400 for commercial customers: high efficiency toilet rebates at $100 for residential customers and $200 for commercial customers; and waterless or high efficiency urinal rebates at $300 for commercial customers.

The City's Toilet Rebate Program was in place from August 1988 through June 1995. An $80 rebate was issued per toilet retrofitted to a 1.6 gallon or less per flush toilet. The rebate was reduced to $40 for the period July 1994 to June 1995. The total number of residential rebates that were issued is 18,842.

BMP 4. Commercial, Industrial and Institutional

Commercial Water Checkups
As mentioned in the Residential BMP section, water checkups are offered for both commercial, industrial, and residential customers.

CII Toilet Rebates. 2,995 toilets at commercial sector sites were retrofitted during the City's Toilet Rebate Program from August 1988 through June 1995.

Save Water, Save a Buck CII Rebate Program. This rebate program offered rebates for the installation of water efficient fixtures for CII water customers and was coordinated by the Santa Barbara County Water Agency. Rebates issued through this program: toilets (1.28 gpf) = 80, (1.6 gpf) = 25, urinals =21, and clothes washers = 32.

Smart Rebates Program
Currently commercial high efficiency toilets, waterless and high efficiency urinals, high efficiency clothes washers, and waterbroom. See information on Smart Rebates Program in Residential BMP section.

Rinse and Save Pre-rinse Spray Valve Program. Through *Rinse & Save*, an innovative door-to-door installation program, restaurants in the City received a free 1.6 gpm pre-rinse spray valve. 199 spray valves were installed in the City in 2003, and 104 from January to September 2005, for a total of 303. Each replaced valve will save approximately one acre foot (326,000 gallons) of water over five years. *Rinse & Save* Program is administered by the CUWCC and funded by a grant from the California Public Utilities Commission and the participating agencies.

Lodging Industry Water Conservation Program consists of table tents and door hangers encouraging patrons to conserve water for lodging industry as well as educational videos for lodging industry staff.

Restaurant Table Cards are provided which inform restaurant customers that water will be served upon request.

BMP 5. Landscape

Smart Landscape Rebate Program

The Smart Landscape Rebate Program offers rebates to increase water efficiency in both the commercial and residential landscapes. Rebates on approved irrigation equipment and landscape materials will be up to 50% of material costs. Rebates are available for up to $1,000 for single family homes and up to $2,000 per account serving irrigated area ($4,000 per site) for commercial, multi-family, and HOAs. Rebate will cover: drip irrigation parts, sprinkler system efficiency retrofits and rotating sprinkler nozzles; water-wise plants and mulch; and smart irrigation controller. The process is 3 steps: a pre-inspection, a 60 day window to complete the approved projects and then a post-inspection. Since the program began in April 2009, there have been 146 participants, with 86 properties completing the rebate process to date.

California Landscape Budgets Program (CLBP)

This program provides monthly water use reports via www.landscapebudgets.com for the properties served by dedicated irrigation meters and compares the usage to a weather-based water allocation calculation. The goal is to provide education to the customers, as well as monthly reporting, identifying ways to help customers irrigate more efficiently. Currently, all City dedicated landscape irrigation meters billing is based on a water budget calculated from historical evaportranspiration data.

Green Gardener Program

The City of Santa Barbara and the Santa Barbara County Water Agency began in March 2000 the Green Gardener Program (GGP) along with eleven other partnering agencies and organizations. The GGP trains gardeners in resource efficiency and pollution prevention landscape maintenance practices. In order to be a Green Gardener, gardeners attend a fifteen-week training session (two and half hour class per week) taught in both English and Spanish covering topics including water efficiency, non-point source pollution reduction, fertilizing, integrated pest management, and reduction of air pollution emissions and green waste. A test covering training material is required for Green Gardener status plus annual ongoing educational requirements. This program includes promotion of the Green Gardeners through advertising and a list of gardeners distributed by partnering agencies and on www.greengardener.org. So far, the GGP countywide has trained 1,000 gardeners.

California Irrigation Management Information System (CIMIS)

Two CIMIS weather stations are owned by the California Department of Water Resources (DWR) are located on the City's Golf Course and the Vic Trace Reservoir. City staff assists in maintenance of the stations. CIMIS is a network of weather stations that automatically read and collect information on wind speed and run, average vapor pressure, air temperature, relative humidity, dew point, solar radiation, soil temperature, and precipitation. The information is transmitted to a central computer data base in Sacramento which gives daily evapotranspiration rates that can be accessed on DWR's website.

Smart Irrigation Controller Distribution Program

In May 2002, the Santa Barbara County Water Agency, City of Santa Barbara, and Goleta Water District began implementing the Smart Irrigation Controller Distribution Program. The program involves distribution and installation of Weather TRAK ET irrigation controllers at no cost to residential customers with significant landscape water usage. The Weather TRAK ET Controller automatically calculates a scientifically-based irrigation schedule based on several factors, including plant and soil type. It then adjusts the irrigation schedule as local weather changes. To date, 180 irrigation controllers have been installed in the City.

Watering Index and Landscape Watering Calculator

Landscape Watering Calculator: This is an easy-to-use web-based tool that helps estimate the right amount of water to give a landscape. The calculator has been designed to give a weekly irrigation schedule. Information needed is zip code of the site, the type of plants watered by a particular station on the irrigation system, the soil type, and the sprinkler type. Available at www.SantaBarbaraCA.gov/water.

Watering Index: On many irrigation controllers there is a feature called "water budget", or seasonal adjust, which one can easily adjust the watering schedule as the weather changes. Set the water budget to the weekly watering index (W.I.) which represents the recommended percentage setting for the water budget feature. The W.I. is normally 100% for much of July and August. Over the course of the year, the W.I. changes to reflect the landscape's changing need for water as climatic conditions change. As new W.I. values are published weekly, the controller's water budget feature should be changed to match to current W.I. value. For the weekly watering index, visit www.SantaBarbaraCA.gov/water.

Free Rain Sensor Program

Free rain sensors are now available from the City of Santa Barbara and Goleta Water District. Rain sensors automatically shut off the sprinkler timer during and immediately after it rains, thus saving tremendous amounts of otherwise wasted water. There are two options to receive a rain sensor: 1. receive a voucher of up to $50 and purchase a rain sensor from approved list, or 2. receive a free rain sensor with a brief training on how to install it. They goal of the rain sensor rebate program is to reduce the amount of water wasted by automatically shutting off irrigation controllers during rain events. Since April 2008, 416 rain sensors have been distributed to City water customers.

Graywater

The City provides outreach on the use of graywater with handouts, fact sheet, sample plan sheet, workshops and information on the City's website. City promotes use of graywater in accordance with the California Plumbing Code Chapter 16A.

Landscape Design Standards. On August 12, 2008, the City Council adopted the revised Landscape Design Standards for Water Conservation, Resolution No. 08-083. The Landscape Design Standards were originally adopted by resolution of the City Council on June 27, 1989. There has been much progress in irrigation technology and sustainable landscaping practices in the last 19 years; therefore, it was time to bring the standards up to date. Chapters 14.23 and 22.80 of the Santa Barbara Municipal Code require projects that are subject to design review to comply with Landscape Design Standards.

Additional Programs

Regional Cooperative Programs
The City participates in many regional water conservation programs with neighboring water purveyors. The Santa Barbara County Water Agency's regional water conservation program administers these programs.

City Facilities Water Conservation Retrofit Program. City facilities are equipped with the latest in water-saving devices, including waterless urinals, low-flow toilets and showerheads. Many City facilities and parks are landscaped with water-wise plants. City facility and parks irrigation systems continue to upgrade with smart irrigation controllers, rain sensors and state-of-the-art irrigation equipment. To date, 145 low-flow showerheads, 317 low-flow toilets, and 22 waterless urinals are installed in City facilities. Eight City public restrooms are plumbed with recycled water for toilet flushing. In one City facility retrofitted two years ago with four waterless urinals, the building's water use has decreased by 45%.

City Facility Requirements for New Construction and Renovations at City Facilities. Require state-of-the-art water conservation technology for landscape, irrigation and plumbing for new construction and renovations at City Facilities. Approved by Resolution No. 08-008 on February 5, 2008.

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Appendix B:

Executive Summary:
Water Conservation Technical Evaluation

Maddaus Water Management

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EXECUTIVE SUMMARY

Introduction

This conservation technical analysis was conducted by Maddaus Water Management (MWM) for the City of Santa Barbara (City). The purpose of the analysis is to:

1. Evaluate current conservation measures and identify new conservation measures that will reduce future water demand.
2. Estimate the costs and water savings of these measures.
3. Combine the measures into increasingly more aggressive programs and evaluate the costs and water savings of these programs.

Long-Term Conservation Program Analysis

A list of 92 potential conservation measures was developed from known water saving technologies and services. Twenty-three conservation measures, selected by the City and local stakeholders during an evaluation workshop, were further analyzed by the Least Cost Planning Decision Support System Model (DSS Model). The DSS Model is a planning tool that assists water planners with evaluating alternative water conservation programs. The model itself is an end use model that calculates water savings, costs and benefits from individual measures, and programs of a number of measures. Projections of future water demand with and without water conservation programs are made for the City water service area. Calculations are made for every year in the 30-year analysis period. In addition, twenty one measures, both current and potential future measures, were put into a "Tool Kit" for further qualitative evaluation.

Based on analysis by the model, conservation measures were grouped into alternative programs of increasingly higher water savings and implementation costs (Table ES-1). Conservation Program A consists of 10 measures that are part of the existing City water conservation program. Conservation Program B includes all of Program A, plus those additional measures that have an individual benefit-cost ratio of 0.9 or greater, for a total of 17 measures. Conservation Program C includes all measures evaluated, except for Measure 5 which is replaced with the enhanced Measure 6. The measures included in Conservation Programs A, B, and C are identified in Table ES-1 in the columns at the right. Figure ES-1 shows the projected demand without the effects of the plumbing code, with the plumbing code effects, and with the plumbing code and three conservation program alternates. Water savings were evaluated and benefit-cost ratios computed for 20–year period of 2011 to 2030, coinciding with the City's water supply planning period. Savings were then calculated to the year 2030 for each of these programs (see Table ES-2).

Table ES-3 shows the relative demand reductions in the year 2030, conservation program costs for the utility, present value economic information, and the utility cost of water saved for each of the alternate programs. Demand reduction by 2030 is measured from the 14,825 AFY projected 2030 demand without the effects of the plumbing code. Additional resources and customer contacts as embodied in the conservation programs identified in this memorandum, are required to reach higher levels of potential water savings. Utility costs include the cost to the City to run the program, including staff time, rebates, any contracted services, expense, etc. While utility cost is the primary consideration, this memorandum also considers customer costs and community costs to some extent, as described in the body of the memorandum. The plumbing code is included as passive baseline savings in addition to the long-term conservation program in Programs A-C. Most of the future program water savings consist of outdoor landscape improvements.

A Benefit-Cost ratio, which is the ratio of the present value of benefits to the present value of costs, is the most accurate indicator of cost-effectiveness. When the ratio of the Present Value of the benefits to the Present Value of the costs is greater than 1.0 for a particular program of measures, that program can be said to be cost-effective. Benefits for the utility can also be expressed as the value to the utility of the saved water. For the City, the value of the saved water is the cost savings from not producing the water that is saved. This could range from not treating pumped groundwater to not buying water from the State Water Project. An

assessment was made by the City and the value of the saved water was determined to be $600 per acre-foot. This value is hereafter referred to as the City's "Avoided Costs".

Program A reflects estimated water savings derived from the plumbing code and continuing the current program. The additional measures that create programs B and C produce increasing incremental water savings and costs. Figure ES-2 illustrates there are apparent diminishing returns when measures are added beyond Program B. Demand reductions for year 2030 range from 920 to 1,919 AF/Yr. As the plumbing code water savings do not cost the City any money, the graph starts at the plumbing code water savings in 2030.

Table ES-1
Conservation Measures Selected for Programs

No.	Measure Name (ND = Requirements for New Development)	Program A	Program B	Program C
1	Promote Water Efficiency in Green Buildings		✓	✓
2	ND Require High Efficiency Toilets		✓	✓
3	ND Require High Efficiency Faucets and Showerheads		✓	✓
4	Fixture Replacement SB 407		✓	✓
5	Financial Incentives for Irrigation and Landscape Upgrades (Current)	✓	✓	
6	Financial Incentives for Irrigation and Landscape Upgrades			✓
7	Washer Rebates	✓	✓	✓
8	Washer Rebates for High Efficiency Machines			✓
9	High Efficiency Toilet (HET) Rebates	✓	✓	✓
10	Single Family Water Check Up	✓	✓	✓
11	Multifamily Water Check Up	✓	✓	✓
12	Existing Commercial Washer Rebate	✓	✓	✓
13	Cisterns/Rain Catchments			✓
14	Gray water Retrofit SF			✓
15	Current High Efficiency Urinal Rebate (<0.25 gallon)	✓	✓	✓
16	ND Require 0.5 gal/flush or less urinals in new buildings		✓	✓
17	School Building Retrofit		✓	✓
18	Irrigation (Landscape) Water Budgets	✓	✓	✓
19	Irrigation Water Surveys	✓	✓	✓
20	Mulch Program			✓
21	CII Water Check Up Level 1	✓	✓	✓
22	CII Water Check Up Level 2		✓	✓
23	Customized CII Incentive Program			✓
	Total Measures in each Program	10	17	22

Figure ES-1

Long Term Demands with Conservation Programs
(Demand is measured by total water system production, including potable and recycled water)

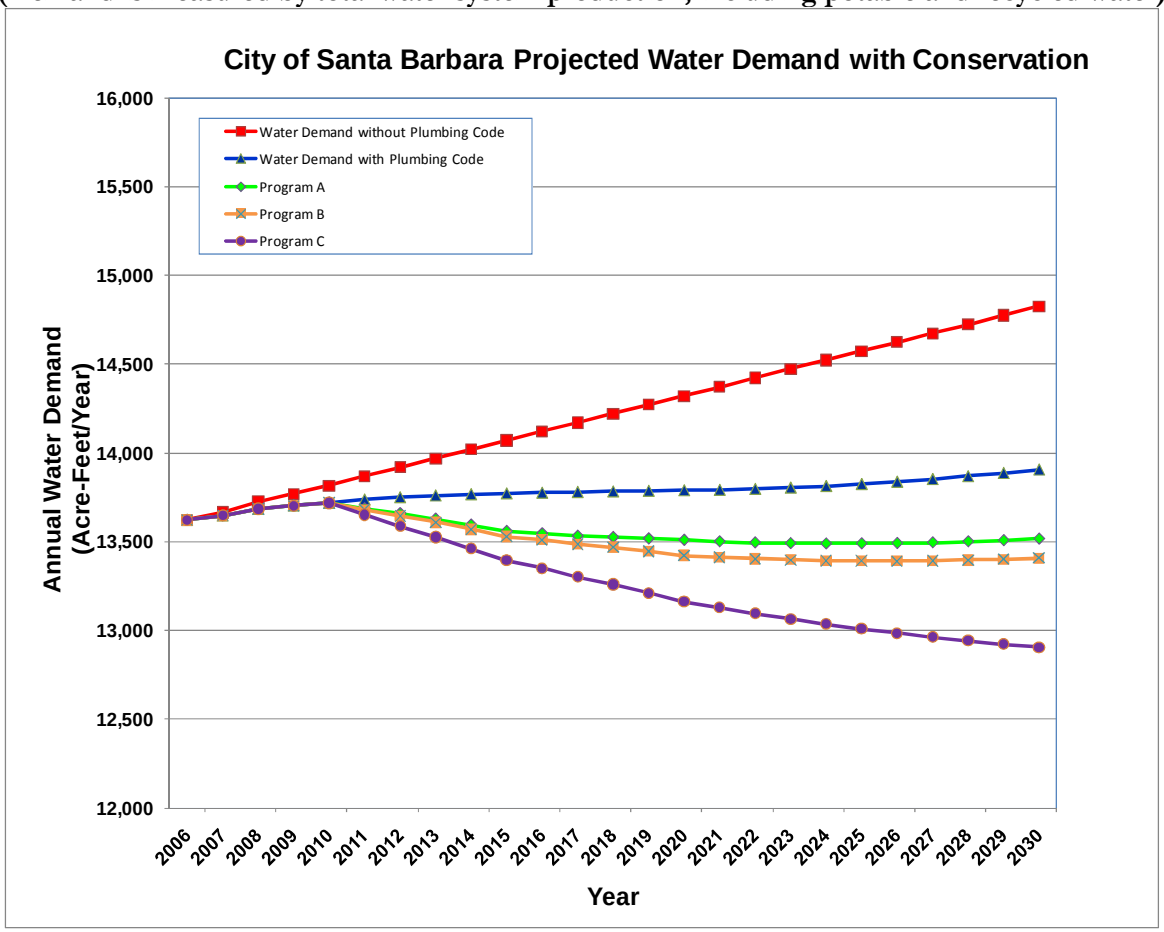


Table ES-2

Conservation Program Description and Future Water Savings

Conservation Program	Description	2030 Demand Reduction (AF/Yr)
-	No Conservation Programs, Plumbing Code Only	919
A	Continue Current Conservation Program (10 measures) and Plumbing Code	1,308
B	Add 7 Cost-Effective Measures to Current Program A and Plumbing Code	1,417
C	Add 5 More Measures to Program B and Plumbing Code	1,919

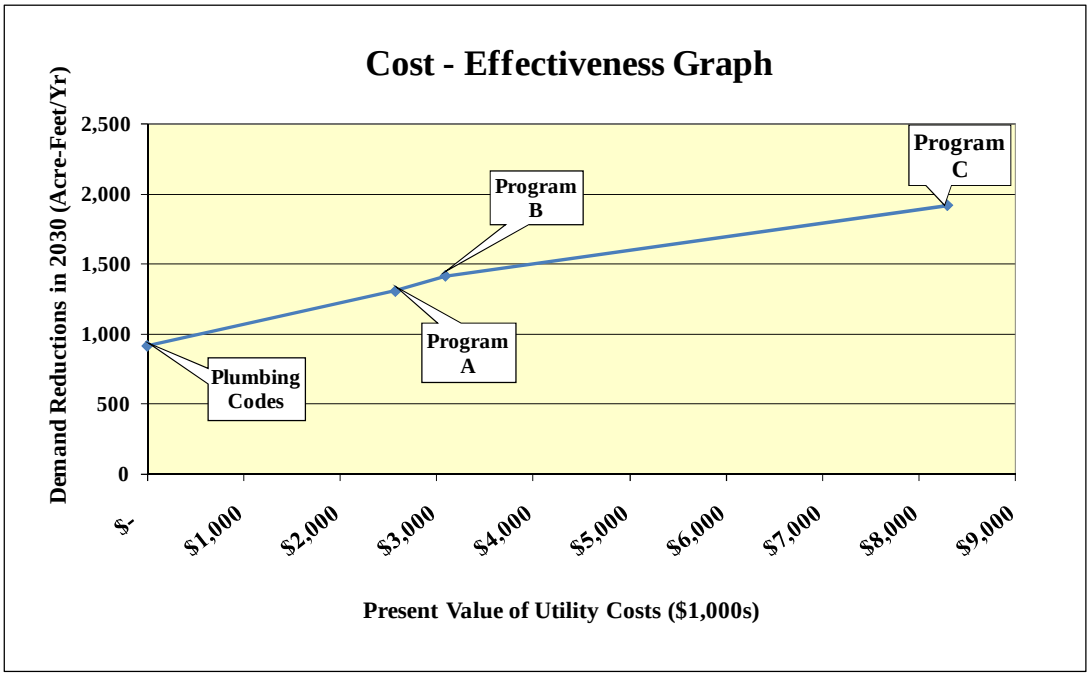
Table ES-3
Economic Summary of Long-Term Conservation Programs
(Excluding Tool Kit Measures)

Conservation Program	Demand Reduction by 2030 (AFY)	Total 20-Year Conservation Program Water Savings (AF)	Average Annual Program Cost to Utility ($)	Present Value of Utility Benefits ($)	Present Value of Utility Costs ($)	Utility Benefit - Cost Ratio	Utility Cost of Water Saved ($/AF)
Plumbing Code Only	919	11,085	NA	NA	NA	NA	NA
Program A + Plumbing Code	1,308	16,419	$194,000	$2,455,000	$2,570,000	0.96	$482
Program B + Plumbing Code	1,417	17,801	$233,200	$3,131,000	$3,089,000	1.01	$460
Program C + Plumbing Code	1,919	23,193	$629,400	$5,867,000	$8,287,000	0.71	$684

Notes:
1. The DSS model is a 30-year model. It was run for 2006 to 2036 to include the base year of 2006 and the 20-year conservation program period of 2011 to 2030.
2. Demand Reduction by 2030 is measured from the 14,825 AFY projected 2030 demand without the effects of the Plumbing Code.
3. Average Annual Program Cost excludes any potential costs for the 21 measures in the Tool Kit
4. Utility Cost of Water Saved somewhat undervalues the cost of savings because program costs are discounted to present value and the water benefit is not. Utility Benefit-Cost ratio is the most accurate measure of cost effectiveness, because it accounts for the time value of money.

Figure ES- 2

Present Value of Utility Costs versus Cumulative (Total) Water Saved



Appendix C:

Long-Term Water Supply Performance Charts

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Water Supply Performance: Scenario A - Current Conditions

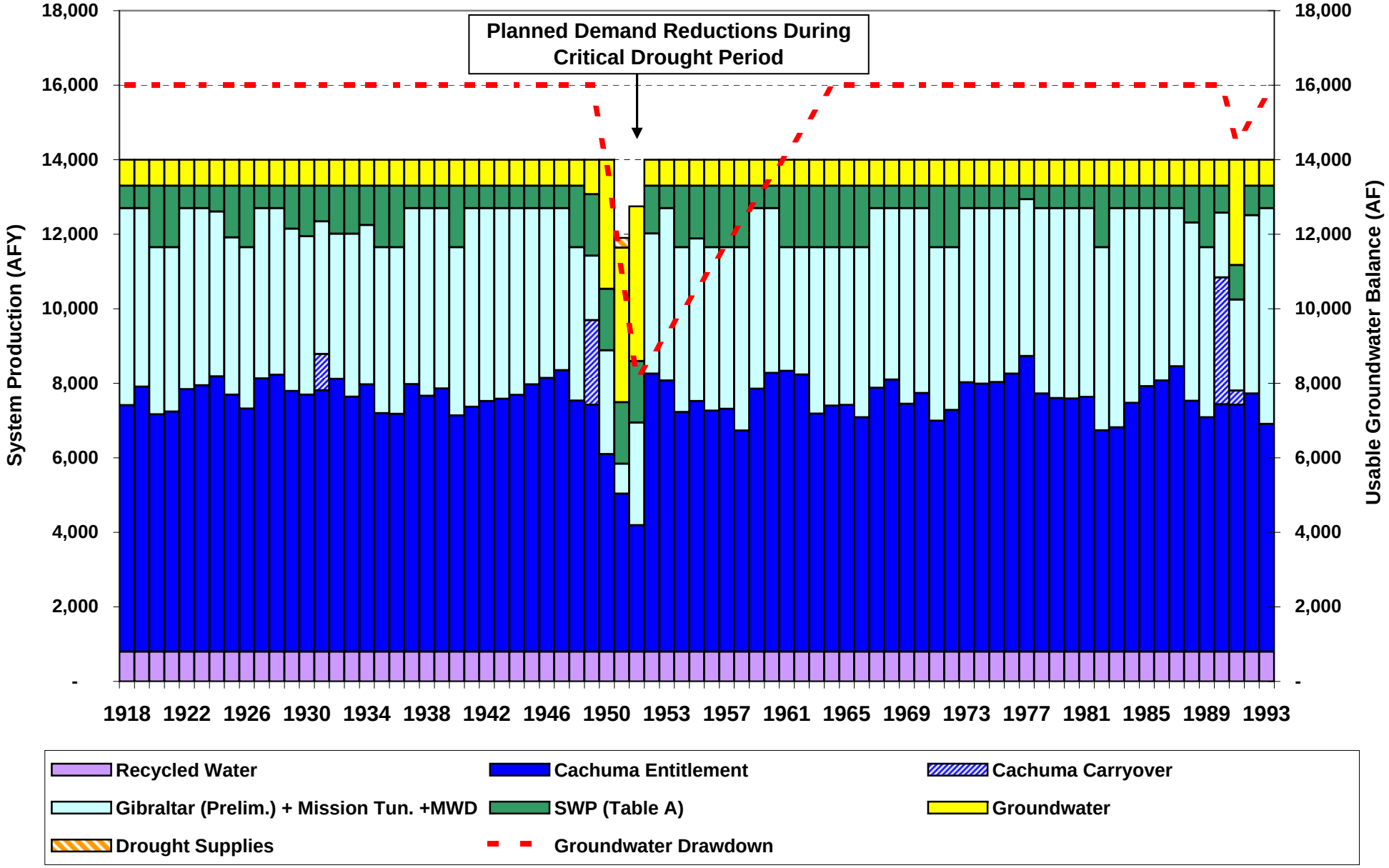
Projected System Demand (AFY): **14,000**

Cachuma Yield Assumption: **Current Entitlement**

Total Critical Period Drought Supplies Required (AF): **262**

Water Supply Target (including Safety Margin): **14,000**

Planned Demand Reductions:	Stage 1	Stage 2	Stage 3
	10%	**15%**	**15%**



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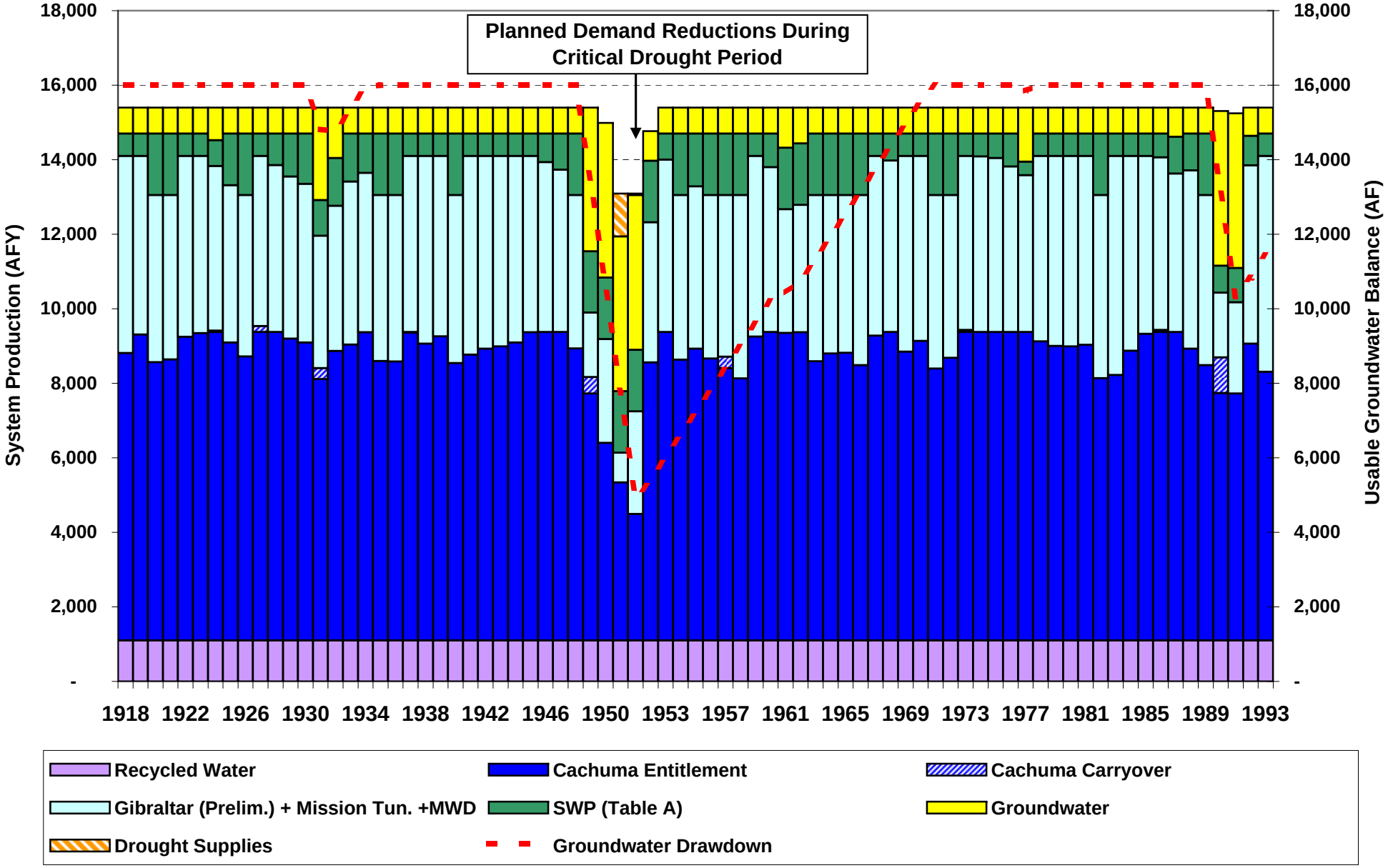
Water Supply Performance: Scenario B - Near Term

Projected System Demand (AFY):	**14,000**	Water Supply Target (including Safety Margin):	**15,400**		
Cachuma Yield Assumption:	**Current Entitlement**	Planned Demand Reductions:	Stage 1	Stage 2	Stage 3
Total Critical Period Drought Supplies Required (AF):	**1,195**		**10%**	**15%**	**15%**



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Water Supply Performance: Scenario C - 2030 Conditions

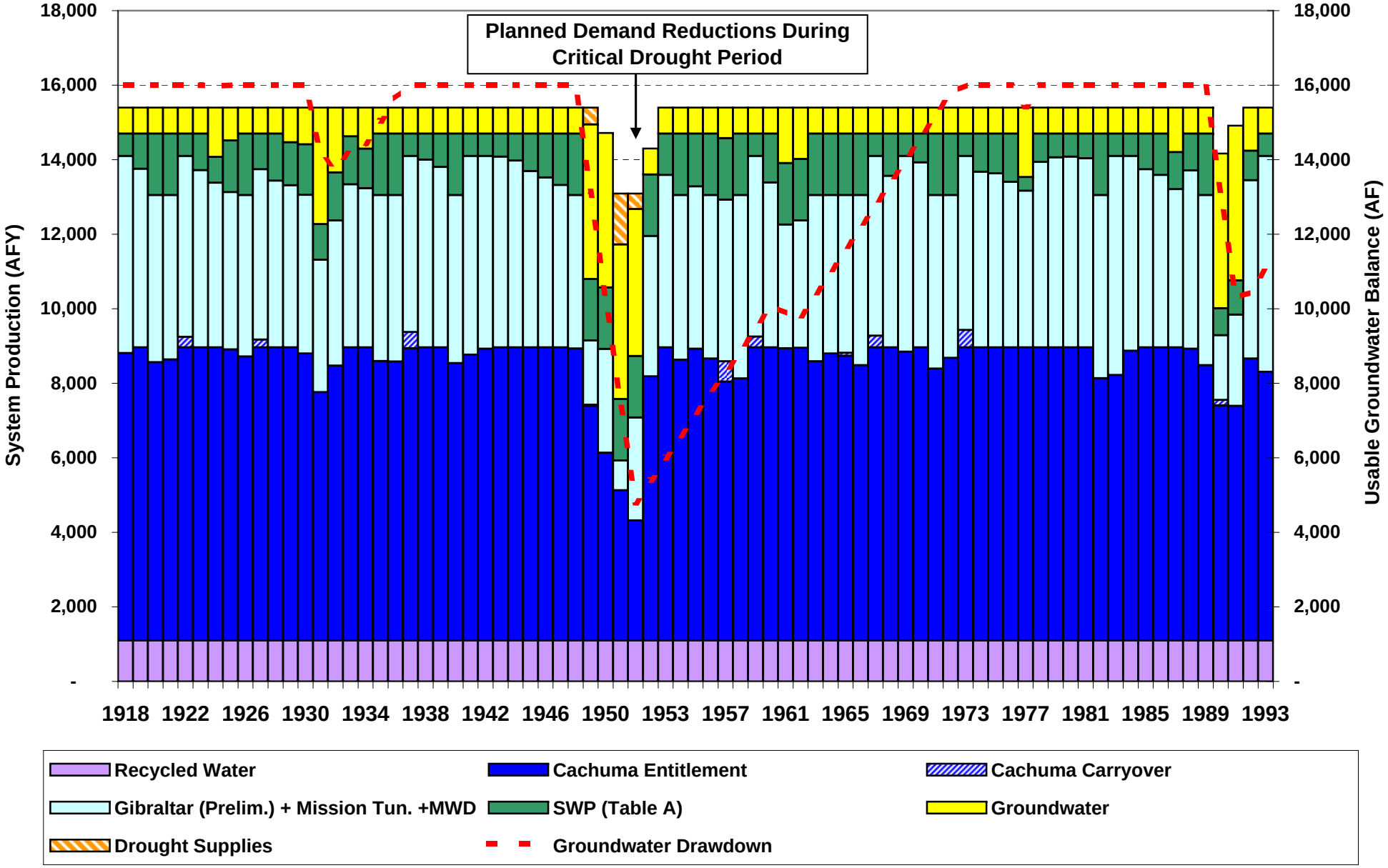
Projected System Demand (AFY): **14,000**

Water Supply Target (including Safety Margin): **15,400**

Cachuma Yield Assumption: **Projected Entitlement**

Planned Demand Reductions: Stage 1 **10%** Stage 2 **15%** Stage 3 **15%**

Total Critical Period Drought Supplies Required (AF): **2,228**



Annual Water Quality Example Newsletter

Santa Barbara Water
June 2010
City of Santa Barbara Annual Water Quality Report

Water Treatment Plant Improvements

High Quality Drinking Water – A Tradition

The Cater Water Treatment Plant was constructed in 1964 to treat water from Lake Cachuma for the residents of Santa Barbara. Over the years it has been expanded to also treat water from Gibraltar Reservoir, and to treat Cachuma water for Montecito, Summerland and Carpinteria. Currently chlorine is added at the beginning of the treatment process to condition the water so that organic matter is filtered out. Chlorine is also added at the end of the treatment process to provide a lasting disinfectant to keep bacteria from growing in the water.

New Water Regulations

Recent changes in regulations set by the U.S. Environmental Protection Agency (EPA) require that the City change the way it treats our drinking water. The EPA has developed a stricter standard for disinfection by-products – chemical compounds that are formed when chlorine reacts with organic materials in the water.

Ozone for Better Water Treatment

To comply with the new EPA regulations, the City will switch to using ozone at the beginning of the water treatment process. Ozone is more effective at conditioning water to remove organic matter. Since the treated water contains less organic matter, fewer disinfection by-products are formed.

Ozone has been used in water treatment for over 100 years. Today there are over 400 water treatment plants in the United States using ozone. The construction costs for the ozone generation facility, ozone contactor (where ozone is mixed with water), and other related plant improvements are anticipated to be $20 million. A low interest loan will provide the funds for this project. The loan will be repaid from water rate revenue. The project is scheduled to begin in 2011.

Cater Water Treatment Plant, located in the San Roque foothills

Lake Cachuma, Cater's main water source

Drinking Water Treatment Regulations

The City gets most of its drinking water from Lake Cachuma and Gibraltar Reservoir. A portion of the City's water also comes from wells. As water travels over land or through the ground, it dissolves naturally-occurring minerals and, in some cases radioactive material, and can pick up substances resulting from the presence of animals or from human activity. Contaminants that may be present in the water source include:

- Microbial contaminants such as bacteria and viruses that may come from wildlife or human activity.
- Inorganic contaminants such as salts and metals that can be naturally-occurring or result from human activities.
- Radioactive contaminants, which can be naturally-occurring.
- Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban storm-water run-off, and residential uses.
- Organic chemical contaminants, including synthetic and volatile organic chemicals that are by-products of industrial processes, petroleum production and use, or agricultural applications and septic systems.

To ensure safe drinking water, federal and state regulations limit the amount of certain contaminants in public water systems. Regulations also establish limits for contaminants in bottled water to provide protection for public health.

In 2009, as in previous years, City of Santa Barbara water met all primary state and federal standards for drinking water. All of the drinking water that comes from Lake Cachuma and Gibraltar Reservoir is treated at the Cater Water Treatment Plant before being distributed to customers. Those who have questions about water quality may call the water department in their community and ask for a copy of their Consumer Confidence Report, such as this.

Special Info Available

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as those who: are undergoing chemotherapy, have undergone organ transplants, have HIV/AIDS or other immune system disorders, or are very old or young can be particularly at risk from infections. These people should seek advice from their health care providers about drinking water. USEPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the EPA Safe Drinking Water Act Hotline at 1-800-426-4791 or www.epa.gov/safewater/.

Safe Drinking Water Hotline and Web Site

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA Safe Drinking Water Act Hotline at 1-800-426-4791 or visiting their website at www.epa.gov/safewater/.

State of the Water Supply

Gibraltar Reservoir is one of the City of Santa Barbara's main sources of water.

Many people wonder how the statewide drought, which has reduced State Water availability, has affected Santa Barbara. Fortunately, the City currently has very limited demand for State Water. Our primary water supply is Lake Cachuma, which is a multi-year storage facility that reduces the impact of periodic dry years. The Gibraltar Reservoir is another important water source. Gibraltar and Cachuma filled completely in 2008 and the moderate El Niño conditions of 2010 were enough to fill Gibraltar and almost fill Cachuma again. Our water supply is in good shape, but we are always just a few years away from another potential drought. This is why water conservation is so important. Water saved this year is available for use in future years if local conditions turn dry again.

Conservation is one of many issues being studied to update the City's Long Term Water Supply Program. The update will assess the City's many supply sources, anticipated demand, and opportunities to boost water conservation and use of recycled water. For more information, visit: SantaBarbaraCA.gov/water or call 564-5460.

For Water Wise Gardening in Santa Barbara County website and CD visit: SantaBarbaraCA.gov/water

Your Water Softener Setting

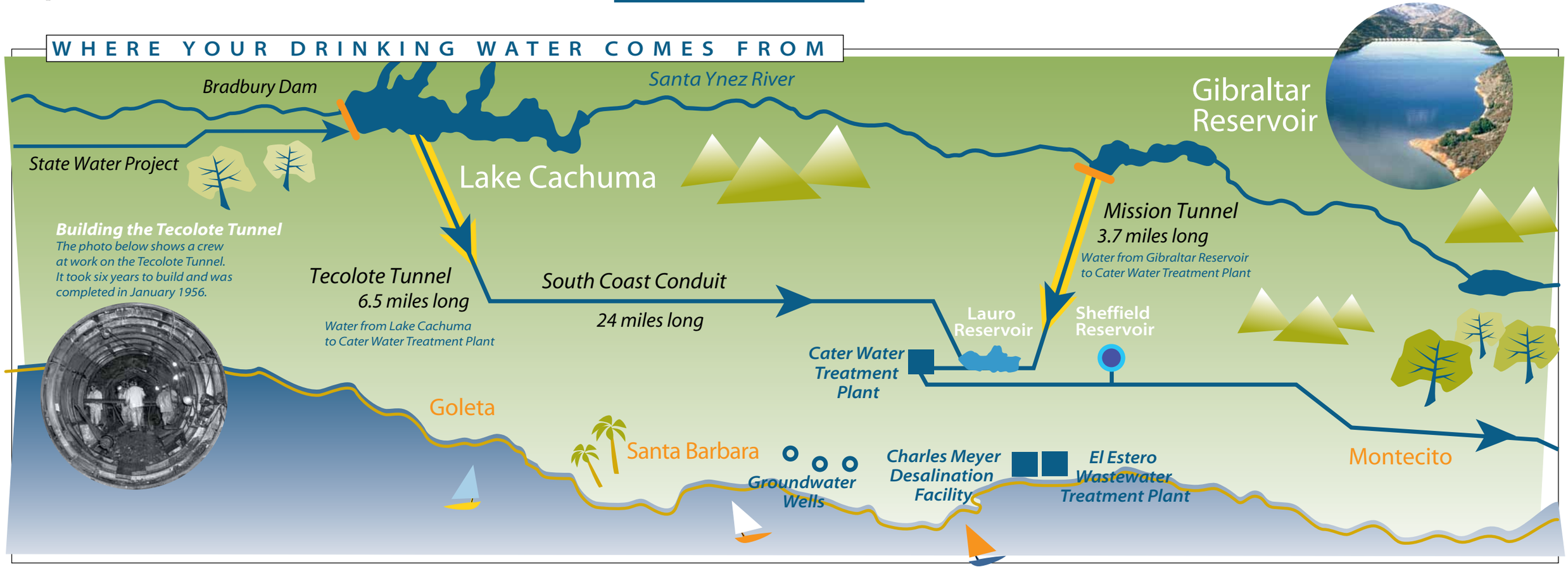
The City's surface water at Cater Water Treatment Plant has a hardness range of 20 to 25 grains per gallon. The City's groundwater supplies have a hardness range of 12 to 40. One grain per gallon equals 17.1 milligrams per liter.

Radon

Radon is a radioactive gas that you can't see, taste, or smell that is found throughout the United States. It occurs naturally in certain rock formations. As a result, radon can be found in Santa Barbara's groundwater. Groundwater is a small part (7.6%) of the City's total water supply. Radon has not been detected in the City's surface water. Radon can enter homes through cracks or holes in foundations and floors. Radon can also get indoors when released from tap water. Test your home if you are concerned about radon. Testing is inexpensive and easy. For additional information, call your State radon program 1-800-745-7236, the EPA Safe Drinking Water Act Hotline 1-800-426-4791, or the National Safe Council Radon Hotline 1-800-SOS-RADON.

Limited Potential for Contamination

The City has evaluated the vulnerability of our water supplies to contamination. For potential contaminates at Lake Cachuma, the use of two stroke engines contributes MTBE to the water. Gibraltar Reservoir's remote location, and the restriction of access to the reservoir limit opportunities for contamination. City groundwater supplies are generally located deep beneath the surface. Nonetheless, there is the potential for contaminants from surface sources such as gasoline stations and dry cleaners to reach City water supplies. All water sources are carefully monitored to ensure that pollutants are not present at levels exceeding state and federal standards. For more information, call 568-1008.



2009 City Drinking Water Quality Report

Definitions

Public Health Goal (PHG)
The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

Maximum Contaminant Level Goal (MCLG)
The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.

Maximum Contaminant Level (MCL)
The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs are set to protect the odor, taste, and appearance of drinking water.

Maximum Residual Disinfectant Level Goal (MRDLG)
The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

Maximum Residual Disinfectant Level (MRDL)
The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Regulatory Action Level (AL)
The concentration of a contaminant which, if exceeded, triggers a treatment or other requirements which a water system must follow.

Treatment Technique (TT)
A required process intended to reduce the level of contaminants in drinking water.

Primary Drinking Water Standards (PDWS)
MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements and water treatment requirements.

Secondary Drinking Water Standards (SDWS)
MCLs for contaminants that effect taste, odor, or appearance of drinking water. Contaminants with SDWS do not affect the health at MCL levels.

Unregulated Contaminant Monitoring Regulations (UCMR)
Data generated by the new UCMR will be used to evaluate and prioritize contaminants on the Drinking Water Contaminant Candidate List, a list of contaminants EPA is considering for possible new drinking water standards. Also known as "State Regulated Contaminants with No MCLs."

Legend

µg/L: Micrograms per liter (parts per billion)
mg/L : Milligrams per liter (parts per million)
ND: Not detected at testing limit
NTU: Nephelometric Turbidity Units
pCi/L : PicoCuries per liter (a measure of radiation)
µmhos/cm: Micromhos per centimeter
DBP: Disinfection By-products
NA: Not applicable or no standard or no data

PRIMARY STANDARDS

Regulated Contaminants with Primary MCLs or MRDLs

	Maximum Contaminant Level (MCL)	Public Health Goal	Highest Single Measurement		Samples ≤0.3 NTU		Major Sources in Drinking Water
Microbiological Contaminants							
Turbidity (NTU)	NA	TT = 1 NTU TT = 95% of samples ≤0.3 NTU	0.06		100%		Natural river sediment/soil run-off
Lead/Copper Rule Monitored at the Customer's Tap			90th % Value	# of Sites Sampled	# of Sites Exceeding Action Level		
Copper (mg/L)	AL, 1.3	0.3	0.26	31	0		Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
Lead (µg/L)	AL, 15	0.2	2.9	31	0		
Disinfection By-products, Disinfectant Residuals, and Disinfection By-product Precursors			System Wide Average		System Wide Range		
Total Trihalomethanes (µg/L)	80	NA	55.1		2.6 - 126		By-product of water disinfection
Haloacetic Acids (µg/L)	60	NA	8.6		ND - 19.0		By-product of water disinfection
Disinfectant - Chlorine as Cl_2 (mg/L)	MRDLG, 4.0	MRDLG, 4	0.63		ND - 2.60		Drinking water disinfectant added to treatment
	MCL	Public Health Goal	Surface Water Average	Surface Water Range	Groundwater Average	Groundwater Range	
Control of DBP Precursors - TOC (mg/L)	TT	NA	2.76	2.24 - 3.19	0.36	0.21 - 0.55	Various natural and manmade sources. Total Organic Carbon (TOC) has no health effects. However, it provides a medium for the formation of disinfection by-products.
Radioactive Contaminants							
Gross Alpha Particle Activity (pCi/L)	15	MCLG, 0	ND	NA	ND	ND - 3.7	Erosion of natural deposits
Radon (pCi/L)	NA	NA	NA	NA	315	310 - 320	See reporting notice on Radon in this report.
Inorganic Contaminants							
Aluminum (mg/L)	1	0.6	0.08	0.01 - 0.30	0.03	ND - 0.25	Erosion of natural deposits
Arsenic (µg/L)	10	0.004	1.3	1.1 - 3.5	0.5	ND - 1.9	Erosion of natural deposits
Chromium (µg/L)	50	MCLG, 100	1.8	ND - 5.6	4.3	ND - 11.9	Erosion of natural deposits
Fluoride (mg/L)	2.0	1	0.43	0.24 - 0.52	0.36	ND - 0.60	Erosion of natural deposits; discharge from fertilizer & aluminum factories
Nitrate as NO_3 (mg/L)	45	45	0.37	ND - 1.24	9.95	0.58 - 41.6	Erosion of natural deposits; run-off from fertilizer use
Selenium (µg/L)	50	MCLG, 50	ND	No Range	7.6	No Range	Erosion of natural deposits

State Regulated Contaminants with No MCLs, i.e. Unregulated Contaminants

	MCL	Public Health Goal	Surface Water Average	Surface Water Range	Groundwater Average	Groundwater Range	
Boron (µg/L)	Notification Level, 1000	NA	380	No Range	110	70 -160	
Hexavalent chromium, - Cr VI (µg/L)	NA	NA	ND	NA	0.58	ND - 1.90	Erosion of natural deposits

SECONDARY STANDARDS

Aesthetic Standards Established By the State of California, Department of Health Services. No adverse health affects from exceedence of standards.

Regulated Contaminants with Secondary MCLs

	MCL	Public Health Goal	Surface Water Average	Surface Water Range	Groundwater Average	Groundwater Range	
Color (Units)	15	NA	ND	NA	0.25	ND - 7	Naturally-occurring organic materials
Copper (mg/L)	1	NA	0.01	ND - 0.05	0.02	0.001 - 0.09	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
Iron (µg/L)	300	NA	ND	NA	42	ND -280	Leaching from natural deposits
Manganese (µg/L)	50	NA	0.2	ND - 2.5	62.6	ND - 200	Naturally-occuring organic materials; causes discoloration of water
Methyl-tert-butyl ether (MTBE) (µg/L)	5	NA	ND	NA	1.5	ND - 6.6	Leaking underground gasoline storage tanks; discharge from gasoline and chemical factories
Threshold Odor Number at 60 °C (units)	3	NA	6	2 - 15	9	1-20	Naturally-occurring organic materials
Turbidity, Laboratory (NTU)	5	NA	0.12	0.07 - 0.20	0.4	0.09 - 1.23	Soil run-off
Uranium (µg/L)	NA	NA	NA	NA	6.5	5.8 - 7.2	Erosion of natural deposits
Zinc (mg/L)	5	NA	0.01	0.006 - 0.02	0.02	ND - 0.17	Naturally-occurring in trace amounts, but can be detected in soft, acidic water systems
Total Dissolved Solids (mg/L)	1000	NA	651	568-714	810	596 - 1160	Run-off / leaching from natural deposits
Specific Conductance (µmhos/cm)	1600	NA	925	852 - 1044	1156	866 - 1758	Run-off / leaching from natural deposits; seawater influence
Chloride (mg/L)	500	NA	22.2	17.2 - 27.4	100	42.8 - 213	Run-off / leaching from natural deposits; seawater influence
Sulfate (mg/L)	500	NA	268	216 - 300	236	156 - 369	Run-off / leaching from natural deposits

Additional Constituents

pH (units)	NA	NA	8.05	7.80 - 8.22	6.99	6.61 - 7.22
Total Hardness as $CaCO_3$ (mg/L)	NA	NA	398	344 - 430	465	214 - 676
Total Alkalinity as $CaCO_3$ (mg/L)	NA	NA	190	178 - 204	248	200 - 313
Calcium as Ca (mg/L)	NA	NA	91.3	79.3 - 99.3	123	84 - 162
Magnesium (mg/L)	NA	NA	40	33 - 48	39	22 - 66
Sodium (mg/L)	NA	NA	45	39 - 52	67	42 - 100
Potassium (mg/L)	NA	NA	4.4	4.0 - 4.7	1.8	1.3 - 2.7

Note: Listed in the table above are substances detected in the City's drinking water. Not listed are more than 135 regulated and unregulated substances that were below the laboratory detection level.

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Get the latest on Santa Barbara's drinking water.

See inside for the City's Water Quality Report.

Save Water Now – It's the Right Thing to Do!

- **Rebates available on water wise landscaping, irrigation system upgrades, clothes washers and more**
- **Receive a free water check-up for your home or business**
- **Adjust your sprinkler timer's schedule based on the weather – use the landscape watering calculator and watering index**
- **Free rain sensor available**

For more information, go to SantaBarbaraCA.gov/water or call 564-5460.

En Español

Este informe contiene información muy importante sobre su agua beber. Tradúzcalo o hable con alguien que lo entienda bien. Si usted tiene preguntas acerca del agua de la ciudad, por favor llame a Don Montoya, a la oficina de Recursos del Agua, al teléfono (805) 564-5387.

For More Information

Questions on the City's water system, call 805-564-5387.

Questions on water quality, call 805-568-1008.

City of Santa Barbara Board of Water Commissioners meets at 3:00 p.m. on the second Monday of each month. Board sessions are open to the public and are usually held in the Public Works Conference Room, located at 630 Garden Street.

SantaBarbaraCA.gov/water

SANTA BARBARA
water
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Questions on Water
Call 805-564-5460

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Local Groundwater Assistance Grant Application
Status of Groundwater Management Plan

City of Santa Barbara - CASGEM Groundwater Level Monitoring Plan

City of Santa Barbara – CASGEM Groundwater Level Monitoring Plan
Proposed Monitoring Wells

Section 1 – Santa Barbara Groundwater Basin (DWR Basin 3-17)

The basin includes Storage Unit #I and Storage Unit #3. (Storage Unit #II, along with the former Goleta East Subbasin, are now considered to make up the Foothill Basin.) Storage Unit #I has an area of approximately 6 square miles and is the principal groundwater source in the Santa Barbara Basin. The depth of the basin ranges from 200 to 900 feet. The unit gets deeper in the southwesterly direction as it approaches the Mesa Fault and in the southeasterly direction as it approaches the Pacific Ocean. An offshore fault is believed form the southern boundary of the unit, though it is not an effective barrier to seawater intrusion. Groundwater is produced from the "Upper Producing Zone" and the "Lower Producing Zone," both of which are mostly confined. The principle challenges in managing this unit are the potential for seawater intrusion during heavy pumping and the relatively small groundwater storage volume. Monitoring wells have been selected with preference for dedicated monitoring wells where possible and avoiding proximity to production wells and creeks.

Storage Unit #III is quite small, with an area of approximately 2.5 square miles. It is not regularly used as a source of municipal groundwater due to inferior groundwater quality, but remains an option in times of severe water supply interruption. Some private wells operate in this unit. The eastern half of the unit is quite shallow, in most places less than 100 feet in depth. Depth increases to about 300 feet in the western portion.

The boundaries and principal geologic features of the Santa Barbara Basin are illustrated in the attached "Figure 1. Geology and streamflow stations..." taken from the 1984 USGS report on the Santa Barbara Groundwater Basin. Attached Figure 2 from the same report illustrates geologic sections of the basin.

Section 2 – Foothill Groundwater Basin (DWR Basin 3-53)

Since the publishing of the 1989 USGS report on the Foothill Basin, the Goleta East Subbasin and Storage Unit No. I of the Santa Barbara Basin have been considered a separate "Foothill Basin." The basin has an area of approximately 4.5 square miles. Pumpage is primarily by the City of Santa Barbara and the La Cumbre Mutual Water Company, with some additional private pumpage. Water is produced primarily from the lower, confined portion of the Santa Barbara Formation, ranging in thickness from less than 100 feet to about 300 feet.

The boundaries and principal geologic features are illustrated in the attached "Figure 3. Location of Geologic Sections" and "Figure 4. Geologic Sections of the Foothill Basin" from the 1989 USGS report.

1978 (Hutchinson, 1979), resulted in the construction of eight monitor wells at two sites along the coast. These wells were designed to provide an early warning of saltwater intrusion into the freshwater aquifer. At each site, wells were installed at four different depths to enable determination of the vertical distribution of water levels and water quality. The purpose of this second phase of the program is to analyze and evaluate the effect of ground-water pumping on the water levels and on water quality of the ground-water basin. The third and final phase of the program will be the development of a digital flow model for the ground-water basin; such a model will help in defining the hydrology and in managing the water resources of the basin.

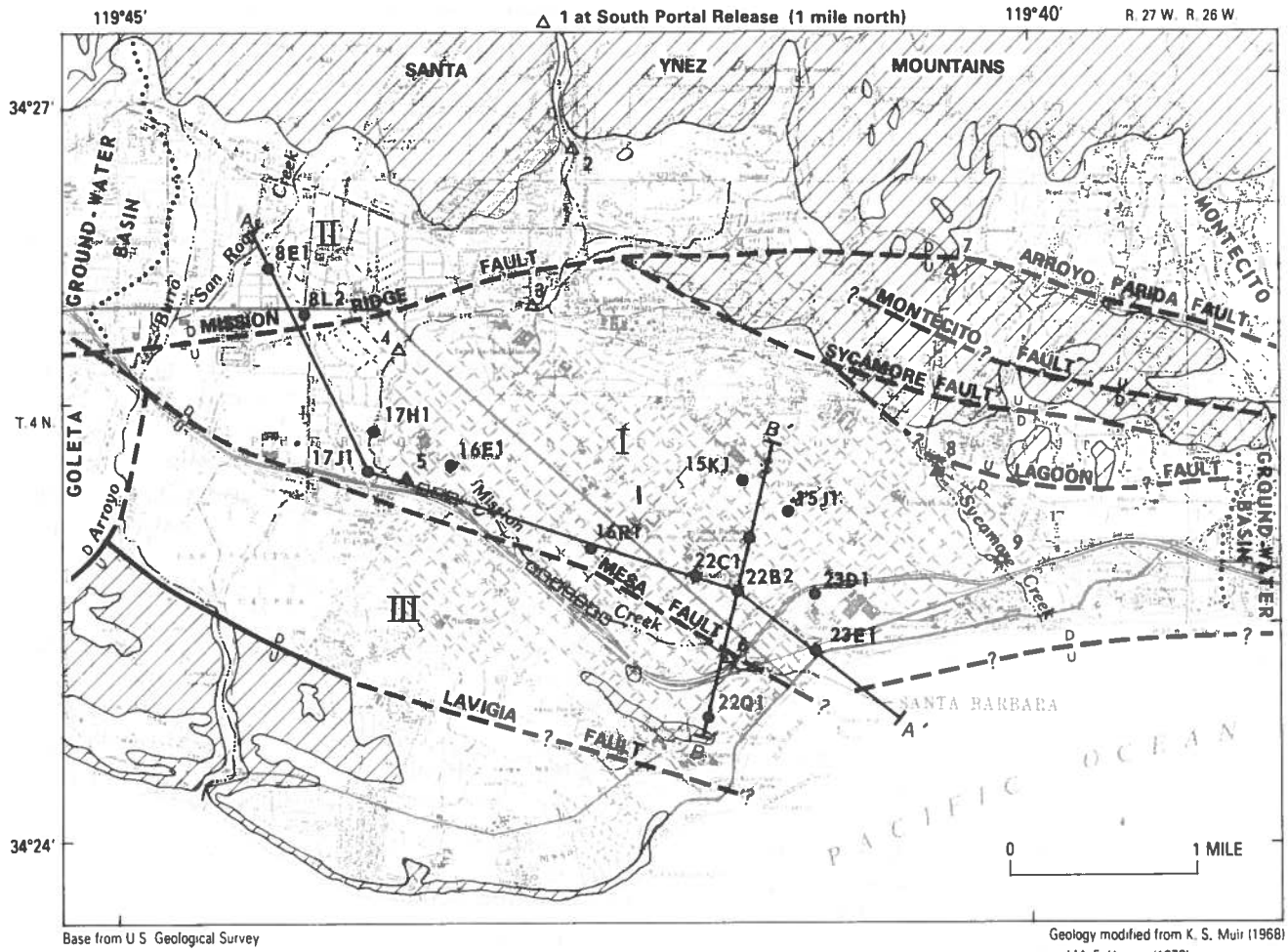
The current phase of the program includes:

1. Describing the geohydrology of the Santa Barbara ground-water basin, with particular reference to the water-bearing deposits, the quantity of recharge to and discharge from the basin, and ground-water levels and movement.
2. Describing the vertical variations in ground-water quality in the basin.
3. Determining the effect of pumping on water levels and water quality in the ground-water basin.

Description of the Area

The Santa Barbara ground-water basin is on the south coast of Santa Barbara County (fig. 1). The basin is bounded on the north by foothills of the Santa Ynez Mountains, on the west by the Goleta ground-water basin, on the south by the Pacific Ocean, and on the east by the Montecito ground-water basin. Hydrologically, the basin is divided into three storage units by the Mesa and Mission Ridge faults (fig 1). The principal area of our concern is Storage Unit I, which encompasses about 7 mi^2.

The Santa Barbara area has a Mediterranean-type climate of warm, dry summers and mild winters. The area has distinct wet and dry seasons; 95 percent



Base from U S Geological Survey
Santa Barbara and Goleta 1:24,000, 1967

Geology modified from K. S. Muir (1968) and M. F. Hoover (1978)

Figure 1. Geology and streamflow stations. Unnamed offshore fault as identified by K. S. Muir (1968).

GEOHYDROLOGY

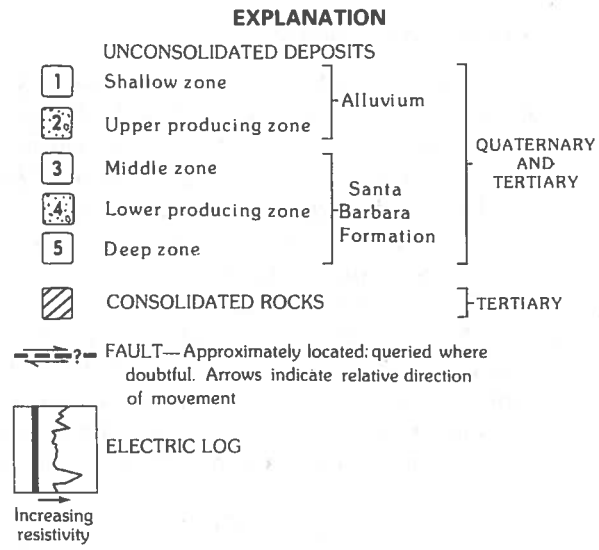
Definition of the Aquifer System

For this report the lithologic units mapped by Dibblee (1966) and Muir (1968) were generalized in the Santa Barbara area into "consolidated rocks" and "unconsolidated deposits." Figure 1 shows the outcrop pattern of the formations, and figure 2 shows their stratigraphic and structural relations.

Consolidated rocks of Tertiary age underlie the ground-water basin and compose the surrounding hills. These consolidated rocks are sedimentary rocks, predominantly marine in origin, that are nearly impermeable except for slightly permeable sandstones, and in fracture zones. Neither the sandstones nor the fracture zones constitute an important source of ground water.

The unconsolidated deposits consist of the Santa Barbara Formation, of late Pliocene and early Pleistocene age, and alluvium of Holocene age. The Santa Barbara Formation lies unconformably on the consolidated rocks and, in most of the basin, underlies the alluvium. This formation is of marine origin, consists of fine to coarse sand, silt, and greenish-gray clay, and has occasional gravel layers. A layer of permeable, fossiliferous sand and gravel occurs near the base of the formation in most of the basin. The alluvium, as used in this report, includes terrace deposits, older alluvium, and younger alluvium. It consists of poorly sorted sand, gravel, silt, yellowish-brown clay, and occasional cobbles and boulders.

The greatest thickness of unconsolidated deposits is more than 1,000 ft and is found in Storage Unit I, adjacent to the northeast side of Mesa fault near the Pacific Ocean. From here the unconsolidated



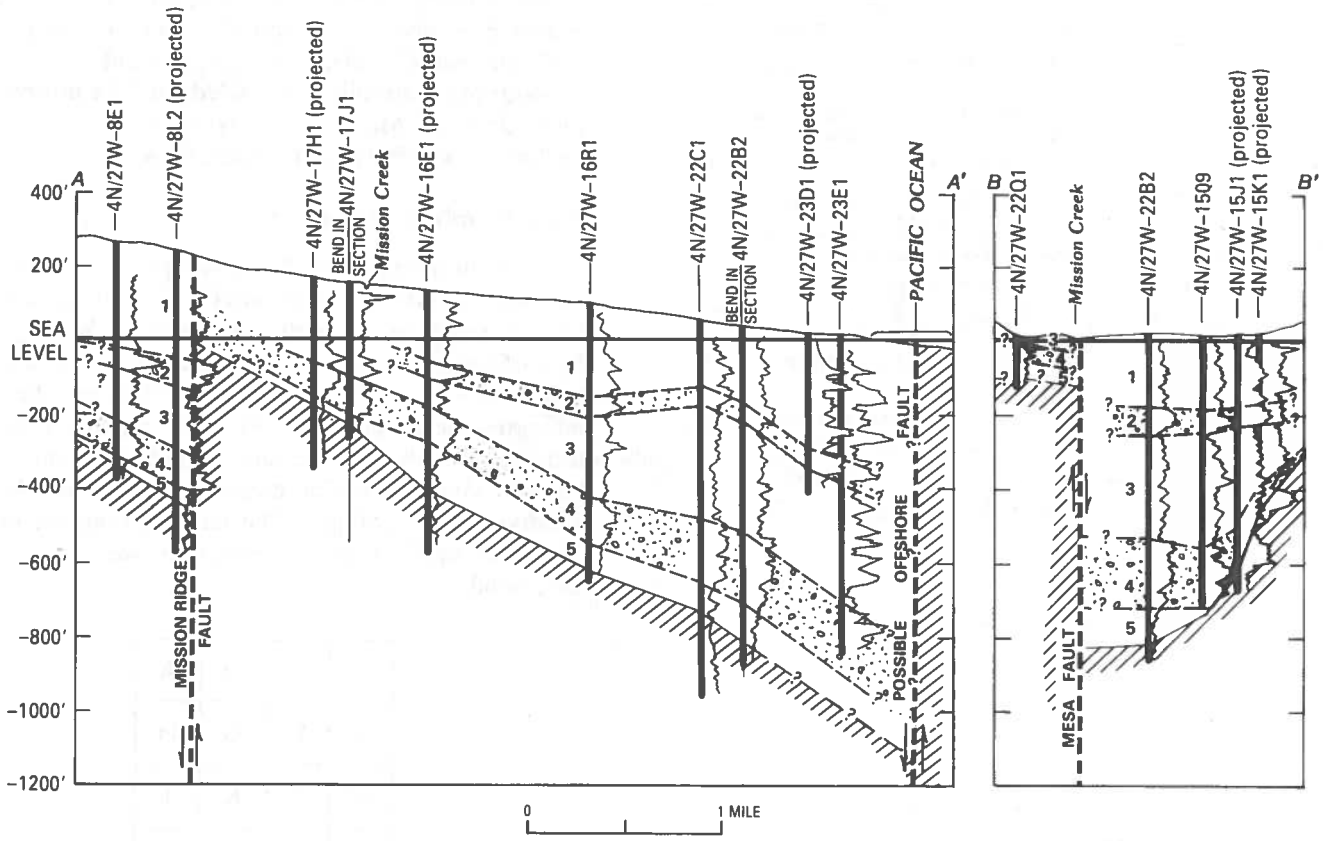
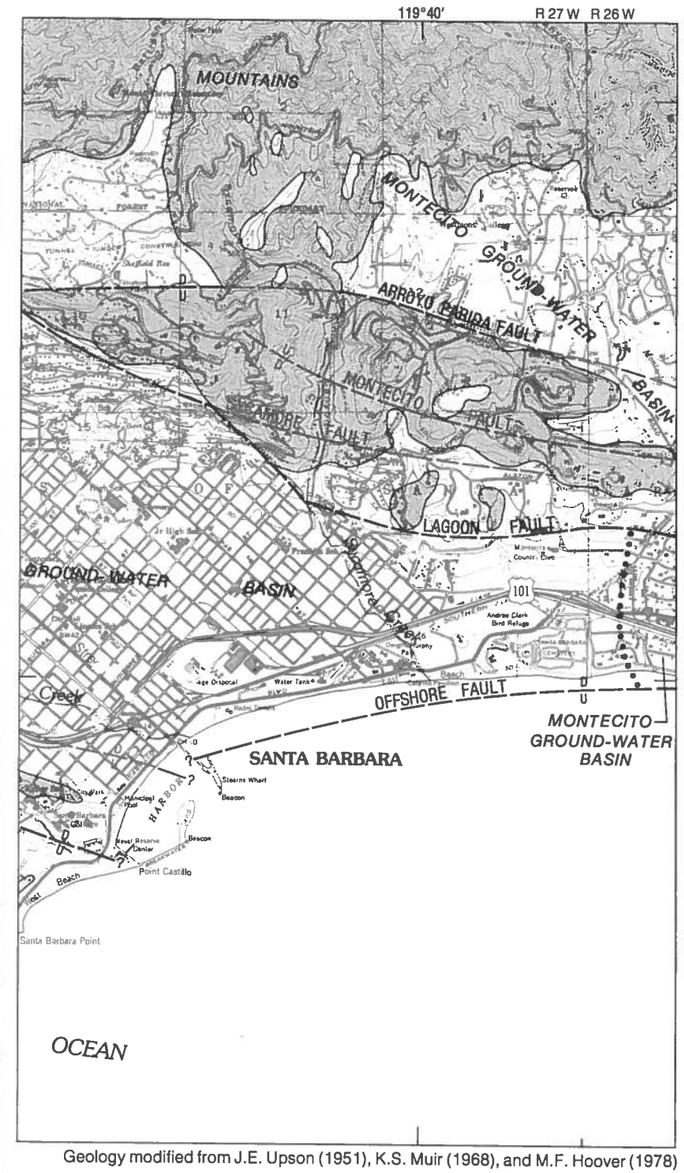


Figure 2. Geologic sections.

Base from U.S. Geological Survey, Santa Barbara and Goleta 1:24,000, 1967

FIGURE 3.—Location of geologic sections.



Geology modified from J.E. Upson (1951), K.S. Muir (1968), and M.F. Hoover (1978)

FIGURE 3.—Continued.

EXPLANATION

UNCONSOLIDATED DEPOSITS (QUATERNARY AND TERTIARY)

CONSOLIDATED ROCKS (TERTIARY)

D/U? FAULT—Dashed where approximately located; queried where doubtful. U, upthrown side; D, downthrown side. Black indicates boundary of ground-water basin

GEOLOGIC CONTACT

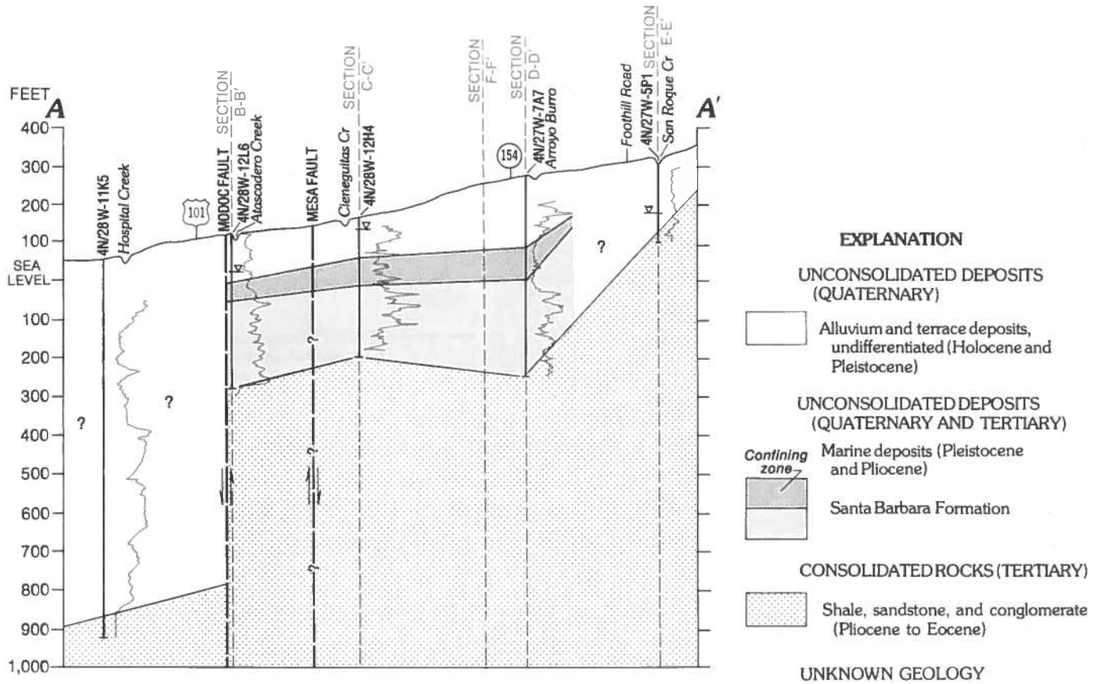
E——E′ LINE OF GEOLOGIC SECTION—Sections shown in figure 4

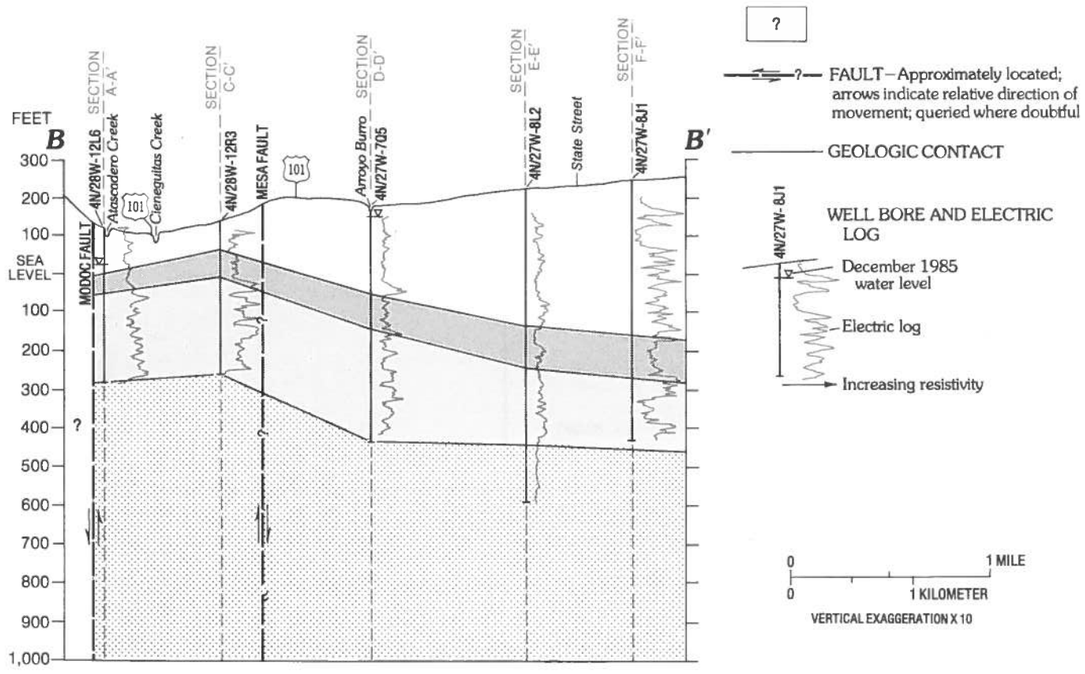
III GROUND-WATER STORAGE UNIT—Former designation of storage unit and subbasin name in parentheses

GROUND-WATER DIVIDE

FORMER GROUND-WATER DIVIDE

•7Q5 WELL AND NUMBER





EXPLANATION

UNCONSOLIDATED DEPOSITS (QUATERNARY)

Alluvium and terrace deposits, undifferentiated (Holocene and Pleistocene)

UNCONSOLIDATED DEPOSITS (QUATERNARY AND TERTIARY)

Contining zone — Marine deposits (Pleistocene and Pliocene)

Santa Barbara Formation

CONSOLIDATED ROCKS (TERTIARY)

Shale, sandstone, and conglomerate (Pliocene to Eocene)

UNKNOWN GEOLOGY

?

?— FAULT—Approximately located; arrows indicate relative direction of movement; queried where doubtful

GEOLOGIC CONTACT

WELL BORE AND ELECTRIC LOG

4N/27W-8J1

December 1985 water level

Electric log

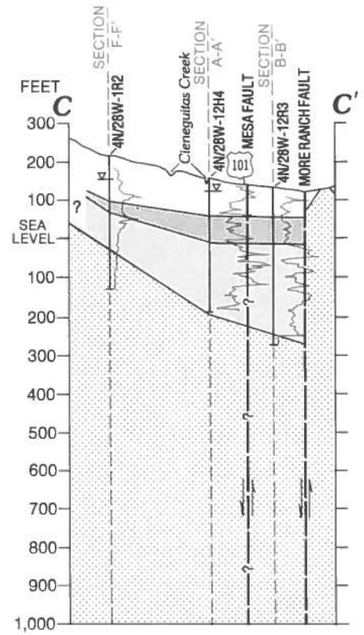
Increasing resistivity

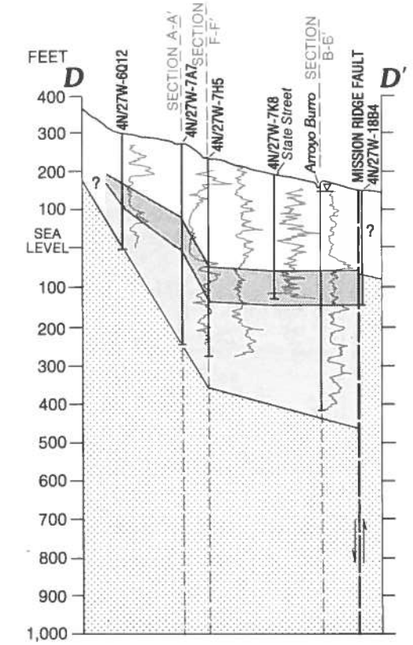
0 1 MILE

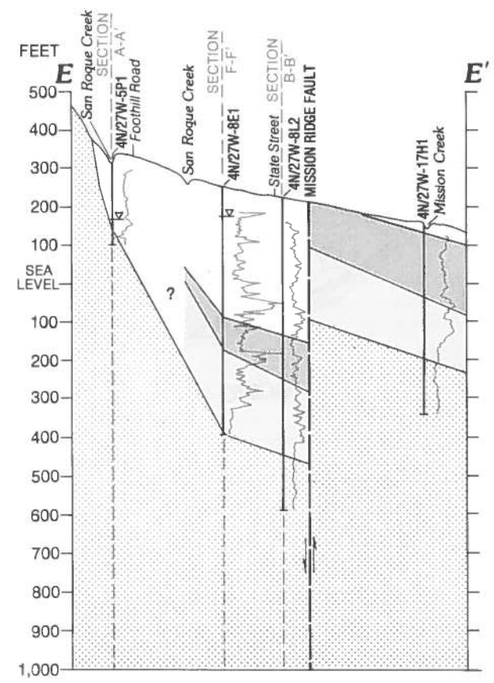
0 1 KILOMETER

VERTICAL EXAGGERATION X 10

FIGURE 4.—Geologic sections of the Foothill ground-water basin.







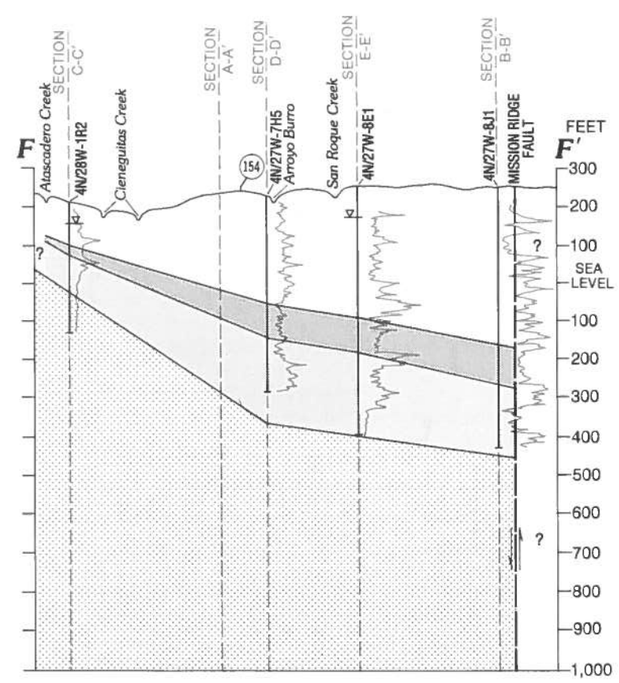
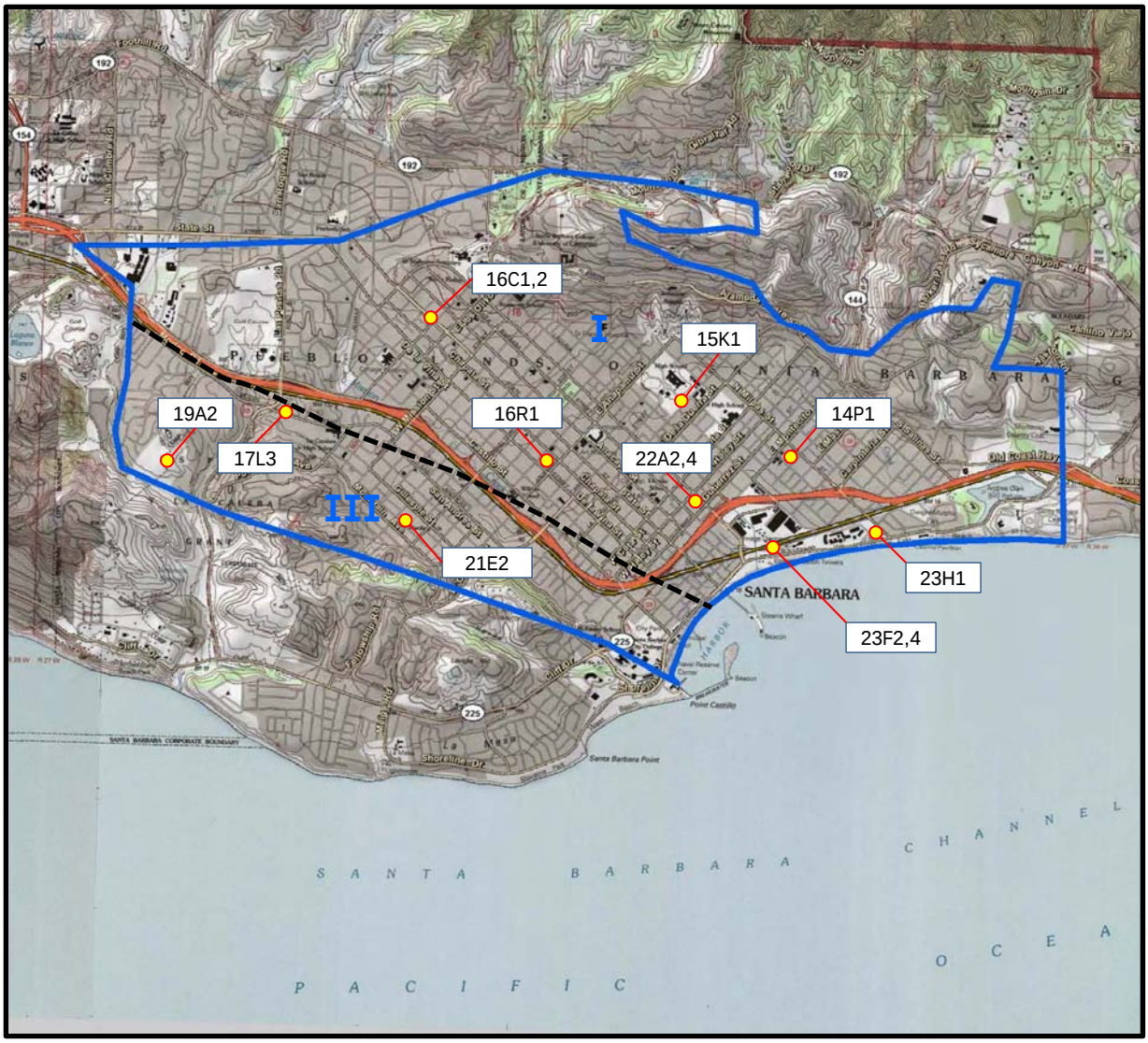


FIGURE 4.—Continued.

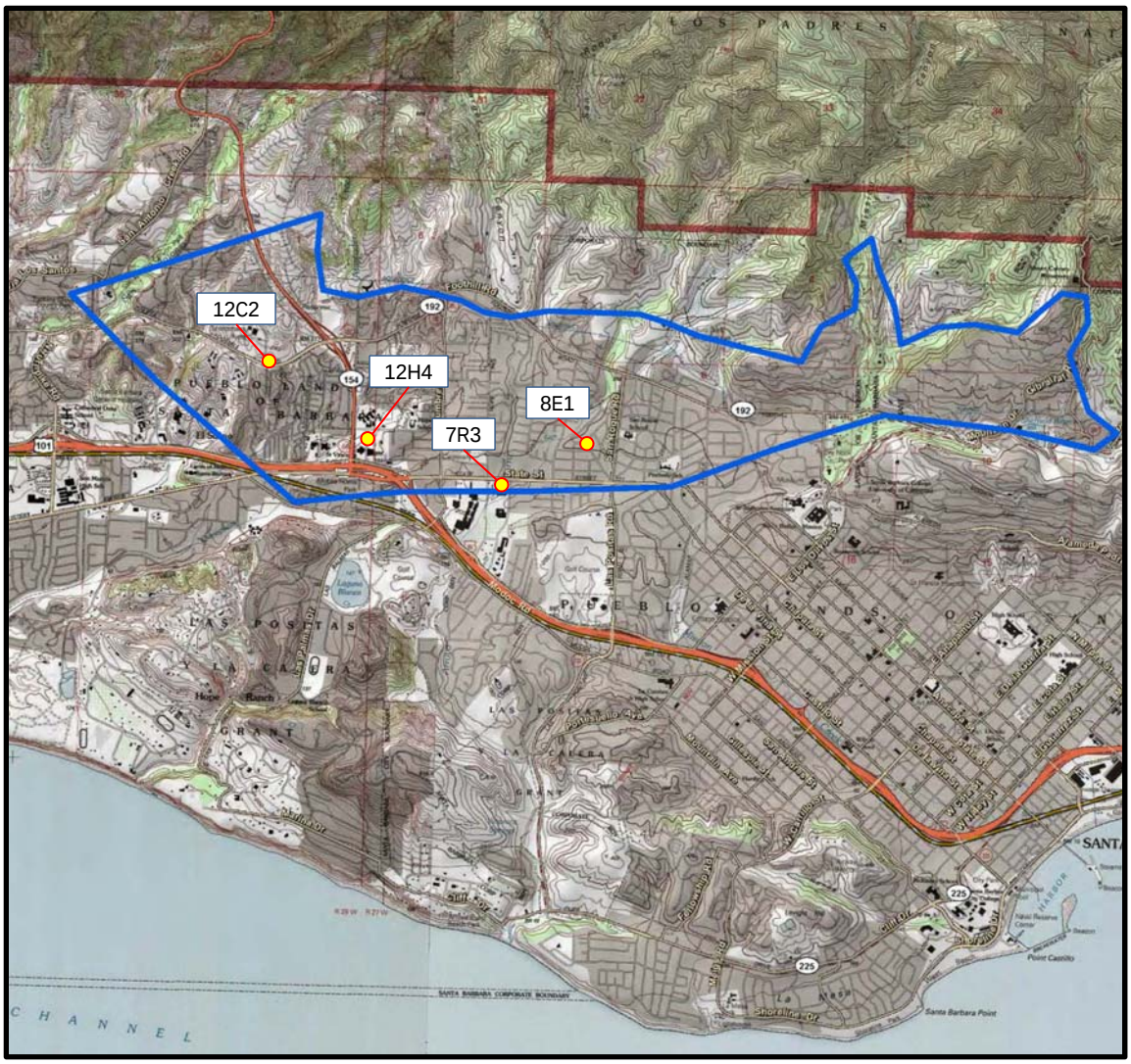
Santa Barbara Groundwater Basin

Proposed CASGEM Groundwater Level Monitoring Wells



Foothill Groundwater Basin

Proposed CASGEM Groundwater Level Monitoring Wells



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Local Groundwater Assistance Grant Application
Status of Groundwater Management Plan

2011 Santa Barbara County Groundwater Report

Ortega Groundwater Treatment Plant Rehabilitation

PILOT-SCALE EVALUATION OF IRON MEDIA FOLLOWED BY SAND/ANTHRACITE FILTRATION FOR REMOVING HYDROGEN SULFIDE, IRON, & MANGANESE FROM CITY OF SANTA BARBARA'S FOUR DOWNTOWN WELLS

DRAFT PROJECT REPORT

PREPARED FOR:

CAROLLO ENGINEERS

PREPARED BY:

WATER QUALITY & TREATMENT SOLUTIONS, INC.
LOS ANGELES, CALIFORNIA

WWW.WQTS.COM

MARCH 30, 2009

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1.0 – INTRODUCTION

1.1 BACKGROUND

The City of Santa Barbara owns and operates a number of groundwater wells, including four wells that contain elevated levels of hydrogen sulfide (H_2S), iron, and manganese. The four wells are Vera Cruz, City Hall, Ortega, and Corp. Yard. Waters from four of these wells are routed to the Ortega Treatment Plant where a greensand treatment system was constructed in the 1970's. However, this treatment system proved inefficient at producing potable-quality water, and the system was shut down in the early 1990's. In 2004, the City initiated an effort to evaluate a treatment technique that could be installed at the Ortega Well site and used to treat the blended water from all five wells. The study focused on the use of acidification and air-stripping for sulfide removal, followed by specialty media filtration for polishing. The off-gas from the air-stripping system required treatment to remove the hydrogen sulfide from the off-gas before it could be discharged into the atmosphere. While the treatment system was efficient at removing sulfide, it included numerous treatment system components that may have been problematic to implement.

In 2008, the City initiated a new pilot testing effort to evaluate a new treatment technology that achieves sufficient removal of sulfide, iron, and manganese. The treatment approach includes two-stage filtration: first through granular iron media, and followed by filtration through conventional sand/anthracite. The use of granular iron media for sulfide removal is a new approach that, to our knowledge, has not be implemented before this study. The great advantage of the two-stage filtration approach is that it could be implemented in the existing greensand pressure vessels at the Ortega well site with only minor modifications. In addition, this approach does not include the production of an off-gas Backwash water from the treatment system would be discharged to the City's sewer system, which would then flow to the City's wastewater treatment plant.

To determine the effectiveness, reliability, and cost of the new treatment system, pilot testing was conducted at the Ortega well site over a period of six months that concluded in January 2009. This report presents the pilot testing setup, the tests conducted, and the results obtained,and makes recommendations regarding its design criteria

1.2 HISTORICAL WATER QUALITY

The waters from the wells conveyed to the Ortega well site differ in quality. However, the common water quality concern is the presence of high levels of sulfide, iron, and manganese. Table 1 lists the values of various water quality parameters measured in each well in 2003. The hydrogen sulfide (H_2S) levels measured in the water from the wells varied from <0.2 mg/L to as high as 16 mg/L. Sulfide imparts a objectionable odor to the water when present at µg/L (ppb) levels. Iron levels ranged from ND (<10 µg/L) to 520 µg/L, which exceeds the secondary MCL of 300 µg/L. In addition, the manganese level ranged from 10 µg/L to as high as 360 µg/L, which is well above the secondary MCL of 50 µg/L. There are other contaminants in the groundwater including tetrachloroethylene (PCE) detected in the Corp. Yard well at approximately 4.0 µg/L, ammonia nitrogen measured in almost all wells between <0.1 to 0.5 mg/L, and radon measured at levels approaching 1000 pCi/L.

Table 1 – Levels of Water Quality Parameters as Measured in City Wells in 2003

Parameter	Unit	Vera Cruz	City Hall	Ortega	Corp. Yard
H_2S	mg/L	<0.2 – 16	0.8 – 4.5	0.8 – 7.3	<0.25
Iron	µg/L	70 – 520	<10 – 420	50 – 470	<10 – 270
Manganese	µg/L	10 – 360	80 – 170	190 – 280	10 – 170
Ammonia-N	mg/L	<0.1 – 0.2	0.1 – 0.5	0.1 – 0.2	<0.1 – 0.3
pH	--	7.0 – 7.8	7.1 – 7.4	7.2 – 7.6	6.9 – 7.2
Total Alkalinity	mg/L as $CaCO_3$	190 – 290	230 – 240	220 – 290	190 – 210
Total Hardness	mg/L as $CaCO_3$	320 – 380	300 – 330	310 – 370	320 – 510
Calcium	mg/L	100 – 110	86 – 93	85 – 92	89 – 96
Temperature	°C	23 – 24	22 – 24	22 – 23	20 – 22
PCE	µg/L	<0.5	<0.5	<0.5	3.3 – 4.8
TOC	mg/L	0.4 – 0.8	0.3 – 1.0	0.3 – 0.7	0.4 – 0.8
Sulfate	mg/L	85 – 92	110 – 120	120 – 130	110
Bromide	µg/L	110 – 330	90 – 110	210 – 220	190 – 200
Turbidity	NTU	0.33 – 4.0	0.21 – 2.9	0.34 – 19	0.16 – 6.9
Radon	pCi/L	744 – 908	200 – 543	555 – 681	521 – 603
TDS	mg/L	530 – 640	490 – 520	550 – 570	520 – 550

The testing conducted in this study focused on the removal of sulfide, iron, and manganese. It was not designed to remove PCE or Radon from the water. The PCE levels measured are below the current PCE MCL of 5 µg/L. There is no current MCL for Radon. The proposed Federal Radon Rule, published in 1999, includes an MCL of 300 pCi/L and an alternate MCL (AMCL) of 4000 pCi/L. A system would comply with the AMCL if it participates in a state-run Multi-Media Mitigation (MMM) program, or run its own MMM program. The Radon level in the City's groundwater is above 300 pCi/L, but well below 4000 pCi/L. For various reasons, the US EPA has not yet finalized the Rule. There is no clear indication if and when the Rule will be finalized, and what the MCLs will be in the final version. Depending on the final outcome of the regulatory process, Radon levels in the City's groundwater, and in the effluent of the treatment system, may be below or above the final MCL.

1.3 Chemistry of Sulfide Removal with Iron Media

Commercially available granular iron media came onto the water treatment market in the late 1990's, and were primarily marketed for arsenic removal from groundwater. While there are numerous iron media on the market, the two most prominent ones are GFH™ media sold by Siemens (www.usa.siemens.com), and Bayoxide™ media sold by Severn-Trent Services, Inc. (www.severntrentservices.com). These two media have proven superior to other iron-based media when it comes to their overall arsenic removal capability. However, we are not aware of any published information on the use of granular iron media for sulfide removal from groundwater. Table 2 lists the general properties of the two media. Both media have similar grain size, but they differ greatly in their bulk density (28 vs. ~78 lbs/ft^3) and how they are

shipped (dry vs. wet). In addition, while the main ingredient of both media is ferric iron, there is a significant difference in the chemical makeup of the media. Approximately 90% of the Bayoxide material is made up of the ferric iron oxide, goethite (α-FeOOH), while GFH is composed mainly of $Fe(OH)_3$ and a weakly crystallized akaganéite (β-FeOOH).

Table 2 – General Properties of GFH & Bayoxide Media

Parameter	Bayoxide	GFH
Manufacturer	Bayer™	GEH Wasserchemie™
US Supplier	Severn Trent Services, Inc.	Siemens USA, Inc.
Grain Size	10 x 35 mesh (~0.5 – 2.0 mm)	0.32 – 2.0 mm
Bulk Density	28 lbs/ft^3	76 – 81 lbs/ft^3
Characteristics	Shipped Dry	Shipped Wet (Damp)
Active Ingredient	Iron oxide composite with 90.1% α-FeOOH (goethite)	52 – 57% $Fe(OH)_3$ & β-FeOOH (akaganéite)

There is evidence in the geochemical literature (e.g., Peiffer et al., 1992)[1] that various forms of ferric iron (Fe^{3+}) oxide can oxidize sulfide to sulfur while the ferric iron is reduced to ferrous iron (Fe^{2+}). The oxidation-reduction reactions are expressed as follows:

Reduction of Ferric to Ferrous: $$2Fe^{3+} + 2e^- \longrightarrow 2Fe^{2+} \quad (1)$$

Oxidation of Sulfide to Sulfur: $$S^{2-} \longrightarrow S^o + 2e^- \quad (2)$$

Combined Oxidation-Reduction Rxn: $$2Fe^{3+} + S^{2-} \longrightarrow S^o + 2Fe^{2+} \quad (3)$$

The ferrous iron (Fe^{2+}) formed then binds with any remaining sulfide present in the water and precipitates as insoluble $FeS_{(s)}$ as follows:

$$Fe^{2+} + S^{2-} \longrightarrow FeS_{(s)} \quad (4)$$

When combining the oxidation-reduction Reaction 3 with the subsequent precipitation Reaction 4, the overall combined reaction is then expressed as:

$$2Fe^{3+} + 3S^{2-} \longrightarrow S^o + 2FeS_{(s)} \quad (5)$$

Under the above mechanism, the mass ratio of iron reduced to sulfide removed is approximately 1.2:1 mg/mg. This means that 1.2 mg of ferric iron dissolves off the media to oxidize and precipitate 1.0 mg of sulfide. In addition, for every 1.0 mg sulfide removed from the water, 0.33 mg elemental sulfur, S^o, is generated, and 1.8 mg $FeS_{(s)}$ is precipitated. As an example, when treating water containing 7.5 mg/L sulfide, approximately 9 mg/L iron is dissolved off the media, 2.5 mg/L of elemental sulfur is formed, and about 14 mg/L of $FeS_{(s)}$ is precipitated.

[1] Peiffer, S., et al. "Kinetics and Mechanism of the Reaction of H_2S with Lepidocrocite", *Environmental Science & Technology*, Volume 26, 1992.

1.4 THE NEED FOR DOWNSTREAM FILTRATION

The previous section discussed how sulfide is oxidized and precipitated as elemental sulfur, S^o, and ferrous sulfide, $FeS_{(s)}$, as the water passes through the iron-media contactors. While much of this precipitated material may be retained on the iron-media, a significant amount of it may pass through the contactors, and would thus require removal. This is one of the reasons a down-stream media filter is required. However, more importantly, the downstream filter provides the primary mechanism for the removal of any dissolved iron and manganese present in the iron-media effluent. Since the iron media is not expected to remove any manganese present in the water – in fact it is expected to add some manganese to the water – the downstream filter is relied upon to remove all the manganese present in the groundwater. This is achieved by adding a low dose of chlorine to the filter influent. The added chlorine will oxidize the iron and manganese present in the water, changing the soluble material into precipitates which can then be removed on the filter media. The result is a treated water that has acceptable levels of iron, manganese, and sulfide. The water will also contain low chlorine residual that will help with secondary disinfection in the distribution system.

2.0 – PILOT SETUP & TESTING PLAN

2.1 PILOT EQUIPMENT SETUP

The pilot testing equipment was provided by Carollo Engineers and was set up at the Ortega well site. Figure 1 shows a schematic of the pilot setup. The pilot system included four filter columns. Three of the columns (referred to as Filters 2, 3, and 4) were set up to operate in parallel, and were set up to contain different configurations and types of iron media. The treated water from any of the three columns can be diverted to an intermediate tank which served as the feed water tank to the fourth filter. The fourth filter (referred to as Filter 1) contained the sand/anthracite media. Sodium hypochlorite was fed to the filter influent stream at a dose necessary to maintain approximately 0.5 mg/L in the treated water. The treated water was collected in a clearwell, which was used as the backwash water source for the three iron-media columns and the sand/anthracite filter. The waste backwash water was collected in a tank before it was discharged to the sewer.

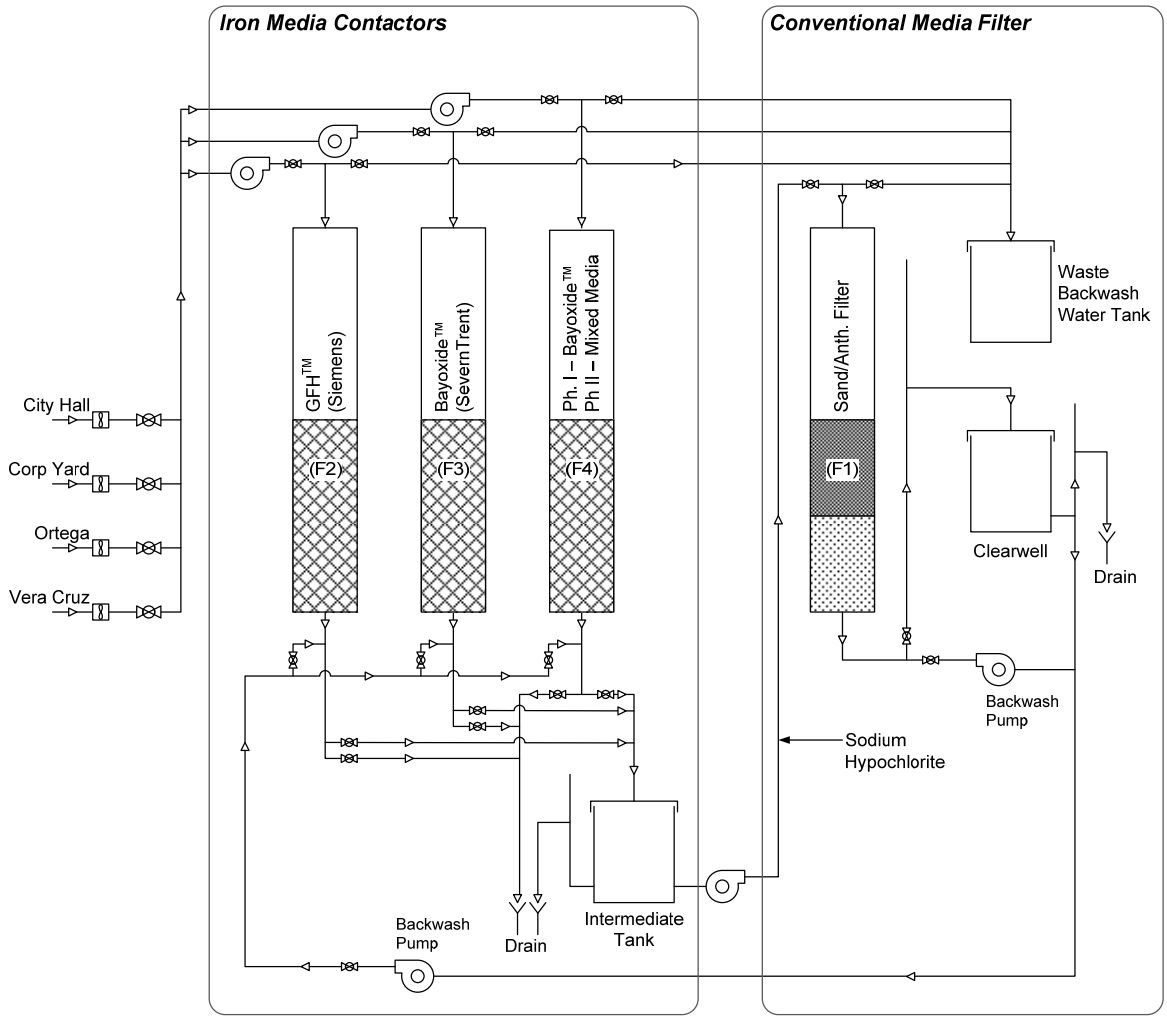

Figure 1 – Schematic of the Pilot Testing Setup

Considering the geometry of the existing pressure filters at the Ortega well site, it was estimated that no more than 36 inches of media could be installed in each vessel. Therefore, approximately 36 inches of iron media was installed in each contactor. For the downstream sand/anthracite filter, 18 inches of anthracite was used over 18 inches of sand. The effective size of the anthracite was 0.95 – 1.05 mm, while that of the sand media was 0.5 – 0.6 mm. The uniformity coefficient of the sand and anthracite media was set at <1.5.

2.2 PILOT TESTING PLAN

Table 3 summarizes the overall operating conditions of all four filters during the pilot study. To help present the results, the testing program is divided into two phases: Phase I was conducted between July 18 and August 31, 2008. During this phase of testing, Filter 1 contained 24 inches of anthracite over 12 inches of sand. Filter 2 contained 36 inches of GFH media, while each of filters 3 and 4 contained 36 inches of Bayoxide media. Filter 2 (GFH media) and Filter 3 (Bayoxide media) were operated at a high loading rate of 8 gpm/sf, while the dual-media filter (F1) was operated at 6 gpm/sf. During the first part of this phase of testing (Phase I-A), the sand/anthracite media filter (F1) was operated downstream of the GFH media contactor. (F2) During the second part of this phase of testing (Phase I-B), the sand/anthracite media filter was operated on the effluent of the Bayoxide media contactor (F3). Finally, Filter 4 (Bayoxide media) was operated at a filtration rate of 4.0 gpm/sf.

Phase II testing extended from October 28, 2008 to January 31, 2009. During this period of testing, there was no change in the media configurations for Filters 2, and 3. However they were operated at lower loading rates.. Filter 2 contained 36 inches of GFH media, while Filter 3 contained 36 inches of Bayoxide media. Filter 4 contained a mix of 18 inches of Bayoxide media and 18 inches of GFH media. Filters 2, 3, and 4 (all iron media contactors) were operated at a filtration rate of 4.0 gpm/sf, while the downstream sand/anthracite media filter was operated at a filtration rate of 3.0 gpm/sf. During the first part of this phase of testing (Phase II-A), the sand/anthracite media filter (F1) was operated downstream of the GFH media contactor (F2). During the second part of this phase of testing (Phase II-B), the sand/anthracite media filter was operated on the effluent of the Bayoxide media contactor (F3). The sand/anthracite media filter was not operated on the effluent of the mixed-media filter (F4).

During the course of the testing, water quality samples were collected from the raw water and the effluent of each filter and analyzed for a number of parameters including sulfide, iron, manganese, and pH. The pilot plant's Programmable Logic Controller (PLC) monitored and recorded various operational parameters, including flowrate through each filter, headloss across each filter, and filtration time. In addition, the PLC monitored and recorded the turbidity of the effluent of the anthracite/sand filter (F1).

The pilot unit was operated in automatic mode in which the computer control system maintained the pre-set flowrate through each filter, and backwashed the iron-media filters based on pre-set values of runtime or maximum headloss. The sand/anthracite media filter was backwashed when pre-set values of turbidity, headloss, or runtime was reached. In addition, for each iron media and for the anthracite/sand filter, the backwash water during one or more backwashes was collected for analysis. Three types of samples were collected and analyzed for various water quality parameters: First, a sample was collected from the mixed waste backwash water. Then, the backwash water was allowed to settle for 30 minutes, and then the clarified supernatant and the settled sludge were sampled.

Table 3 – Summary of Phase of Testing & Operating Conditions in Each Phase

Phase of Testing	Filter 1	Filter 2	Filter 3	Filter 4
07/01/08 – 07/17/08	Set up, Calibration, & Startup			
Phase I-A: 07/18/08 – 08/08/08	▪ 12-in. Sand ▪ 24-in. anthracite ▪ 6 gpm/sf ▪ Treating F2 Eff.	▪ GFH™ Media ▪ 36 inches ▪ 8 gpm/sf	▪ Bayoxide™ ▪ 36 inches ▪ 8 gpm/sf	▪ Bayoxide™ ▪ 36 inches ▪ 4 gpm/sf
Phase I-B: 08/09/08 – 08/31/08	▪ 12-in. Sand ▪ 24-in. anthracite ▪ 6 gpm/sf ▪ Treating F3 Eff.	Off-line		
Sept. 2008	System was shut down at end of Phase I due to high levels of iron in F3 and F4 effluents (>3.0 mg/L) suggesting that the Bayoxide Media was exhausted			
October 2008	New media were installed in all four filters, but the system had to be shut down most of the month because of various power problems and the need to replace the pilot pumps at a number of wells			
Phase II-A: 10/28/08 – 12/11/08	▪ 12-in. Sand ▪ 24-in. anthracite ▪ 3 gpm/sf ▪ Treating F2 Eff.	▪ GFH™ Media ▪ 36 inches ▪ 4 gpm/sf	▪ Bayoxide™ ▪ 36 inches ▪ 4 gpm/sf	▪ Mixed GFH & Bayoxide Media ▪ 36 inches ▪ 4 gpm/sf
Phase II-B: 12/12/08 – 01/31/09	▪ 12-in. Sand ▪ 24-in. anthracite ▪ 3 gpm/sf ▪ Treating F3 Eff.			

Finally, while the pilot plant had an automatic control system, it included a single backwash pump with manual flow control, which limited the backwash flow rate and duration to a single value each. This is not ideal since the iron media is typically backwashed at a lower flowrate than the sand/anthracite media. Nevertheless, during this pilot study, the backwashing configuration was set up for all four filters as follows:

- Backwash Rate = 18 gpm/ft^2
- Backwash Duration = 10 minutes

The above values translate into a Unit Filter Backwash Volume (UFBV) of 180 gal/ft^2 of filter area.

3.0 – RESULTS & DISCUSSION

This section presents the results of the pilot testing effort. The first section presents the general quality of the groundwater treated by the pilot plant. The second section presents the results of Phase I testing, while the third section presents the results of Phase II testing. The fourth section presents the results of water quality monitoring conducted on the waste backwash water from the two iron media and the sand/anthracite filter.

3.1 RAW WATER QUALITY

Table 4 presents the results of analytical work conducted by the City's laboratory and FGL laboratory for general water quality parameters. Two sampling events were conducted on 11/12/2008 and on 12/17/2008.

Table 4 – General Raw Water Quality during Pilot Testing

Parameter	Unit	11/12/2008	12/17/2008
Sulfide	mg/L	14	7.0
Alkalinity (as $CaCO_3$)	mg/L	278	265
Calcium	mg/L	102.5	95.3
Hardness, Total (as $CaCO_3$)	mg/L	356	340
pH	--	7.3	7.3
TOC	mg/L	0.92	0.81
Aluminum	µg/L	107	141
Antimony	µg/L	<0.2	<1.0
Arsenic	µg/L	0.3	<1.0
Barium	µg/L	92.6	77.5
Cadmium	µg/L	<0.2	<1.0
Copper	µg/L	2.2	5.2
Chromium	µg/L	1.2	<1.0
Iron	µg/L	180	107
Lead	µg/L	0.8	1.9
Manganese	µg/L	156	161
Mercury	µg/L	<0.2	<0.2
Nickel	µg/L	2.8	2.2
Selenium	µg/L	0.4	<1.0
Silver	µg/L	1.8	4.3
Thallium	µg/L	<0.2	<1.0
Zinc	µg/L	10.3	9.8
Boron	mg/L	0.1	NA
Cyanide	mg/L	<0.004	<0.004
Radon	pCi/L	715 ± 33.0	649 ± 35.5
Sulfur	mg/L	58	NA

The raw water samples analyzed and presented in Table 3 were collected from the influent to the pilot plant during Phase II testing. On 11/12/2008, the influent water to the pilot plant was 100% Vera Cruz well water, while on 12/17/2008 it was a blend of Vera Cruz well water and City Hall well water. This is apparent in the levels of sulfide measured in the water. In general, the quality of the water during pilot testing was within the range of historical water quality presented in Table 2. However, Table 3 also includes levels of a number of metals including aluminum, copper, lead, nickel, and zinc. These metals, while present at very low levels in the groundwater, could adsorb onto the iron media and concentrate in their backwash water. Since the backwash water will be discharged to the sewer, it is important to quantify the amount of metals in the discharge. This is discussed later in Section 4.3.6.

3.2 PHASE I RESULTS

Phase I testing was conducted in July and August 2008. The configuration of the media and the operating conditions are listed in Table 2. During this period, the filter containing the GFH media (F2) and one of the filters containing the Bayoxide media (F3) were operated at a high loading rate of 8.0 gpm/sf. The other filter containing the Bayoxide media (F4) was operated at a loading rate of 4.0 gpm/sf. The sand/anthracite media filter (F1) was operated at a loading rate of 6.0 gpm/sf. During Phase I-A, the sand/anthracite media filter (F1) was operated downstream of the GFH media (F2). During Phase I-B, F1 was operated downstream of the Bayoxide media (F3).

Figure 2 shows the profiles of the concentrations of sulfide, iron, and manganese in the feed water to the pilot plant. (note that this is a logarithmic scale) During this phase of testing, the feed water to the pilot plant was 100% Vera Cruz well water. The water contained approximately 10 mg/L sulfide. The iron level was approximately 0.1 mg/L, while the manganese level was slightly over 0.2 mg/L.

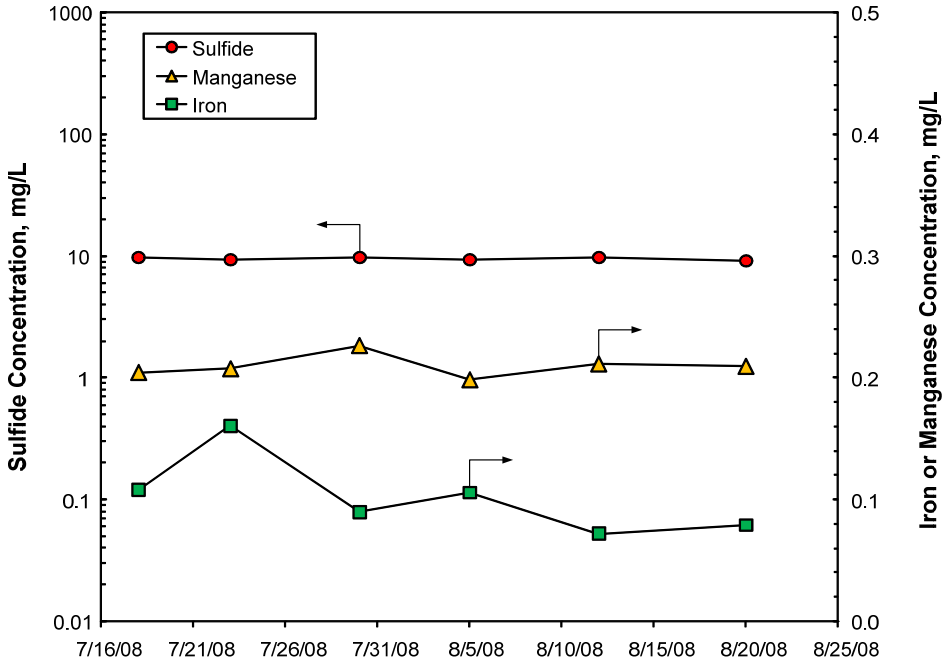

Figure 2 – Raw Water Sulfide, Manganese, & Iron Profiles during Phase I Testing

Figure 3 presents the profiles of sulfide concentration in the raw water and in the effluents of all four filters. It is noted that the concentration scale in Figure 3 is logarithmic. With the influent water concentration at 10 mg/L, the concentration of sulfide in the effluent of the Bayoxide media operated at 8 gpm/sf was between 0.5 and 1.0 mg/L, while that in the effluent of the Bayoxide media operated at 4 gpm/sf was between 0.1 and 0.4 mg/L. This suggests that the removal is limited by the kinetics of the process, which implies that better removal is achieved at lower loading rates. The removal of sulfide with the GFH media was significantly higher than that achieved with the Bayoxide media. During Phase I-A when the GFH media was in operation, the effluent sulfide concentration from the GFH media was below 0.1 mg/L. This represents a removal of >99%, even at a loading rate of 8 gpm/sf. Finally, the sulfide level in the downstream sand/anthracite filter (F1) was either at or below the method detection limit of 0.01 mg/L (10 µg/L). This high removal was achieved during Phase I-A when the sand/anthracite filter was treating the GFH-treated water as well as during Phase I-B when it was treating the Bayoxide-treated water. This is despite the fact that the sulfide level in the Bayoxide-treated water was as high as 1.0 mg/L. This suggests that the sand/anthracite filter achieved >99% removal of the remaining sulfide.

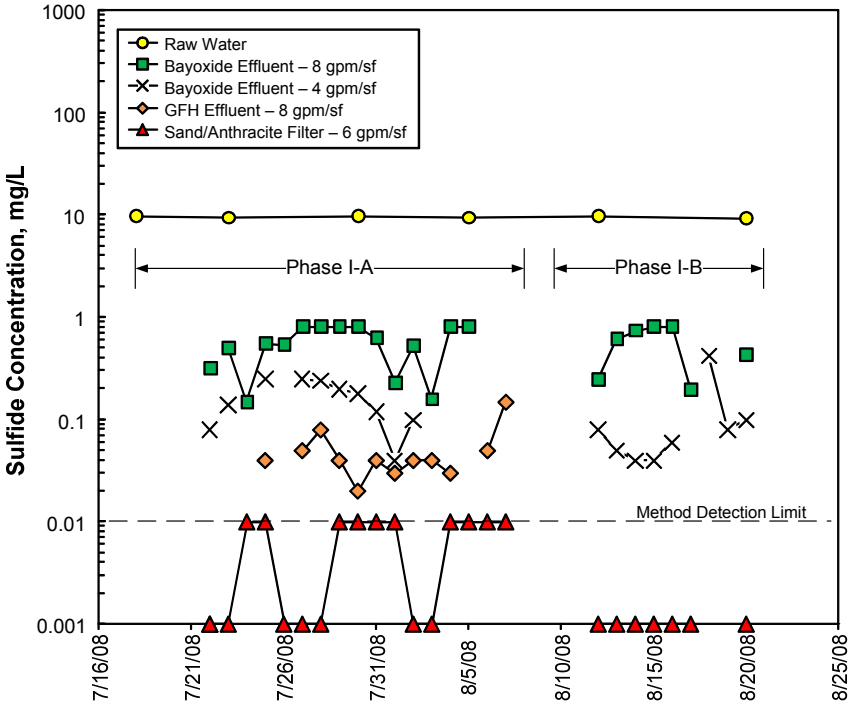

Figure 3 – Sulfide Removal through the Pilot Filters during Phase I Testing

While the GFH media achieved higher sulfide removal than the Bayoxide media, it experienced a structural integrity problem in that it continuously disintegrated into smaller grains that washed out during backwashing, resulting in significant media loss. During approximately 24 days of Phase I-A testing, the GFH media level decreased from 36 inches to 24 inches (33% loss). On the other hand, while the Bayoxide media removed less sulfide, it did not experience the structural deterioration by observed for the GFH media. In fact, the Bayoxide media level

inexplicably increased over the course of the testing. Additional information is presented on this issue in the section presenting the results of Phase II testing.

Figure 4 presents the iron profiles in raw water and in the effluents of all four filters during Phase I testing. During this period, the raw water iron concentration did not exceed the MCL. However, the iron media release a significant amount of iron into the water. During Phase I-A, the iron level in the GFH media effluent was the highest compared to that in the effluents of the other two filters containing Bayoxide media. At the end of Phase I-A when the GFH media experienced structural integrity problems, the effluent iron concentration increased to 3.2 mg/L, which began to affect the ability of the downstream sand/anthracite filter to remove iron. At that time, the GFH filter was shut down, and the feed to the sand/anthracite filter was switched to the effluent of the Bayoxide filter operated at 8 gpm/sf (Phase I-B). During this period, the iron concentration in the influent to the sand/anthracite filter ranged from 0.5 mg/L to 1.0 mg/L. However, the iron concentration in the effluent of the sand/anthracite filter was maintained at <0.02 mg/L compared to the iron secondary MCL of 0.30 mg/L in drinking water.

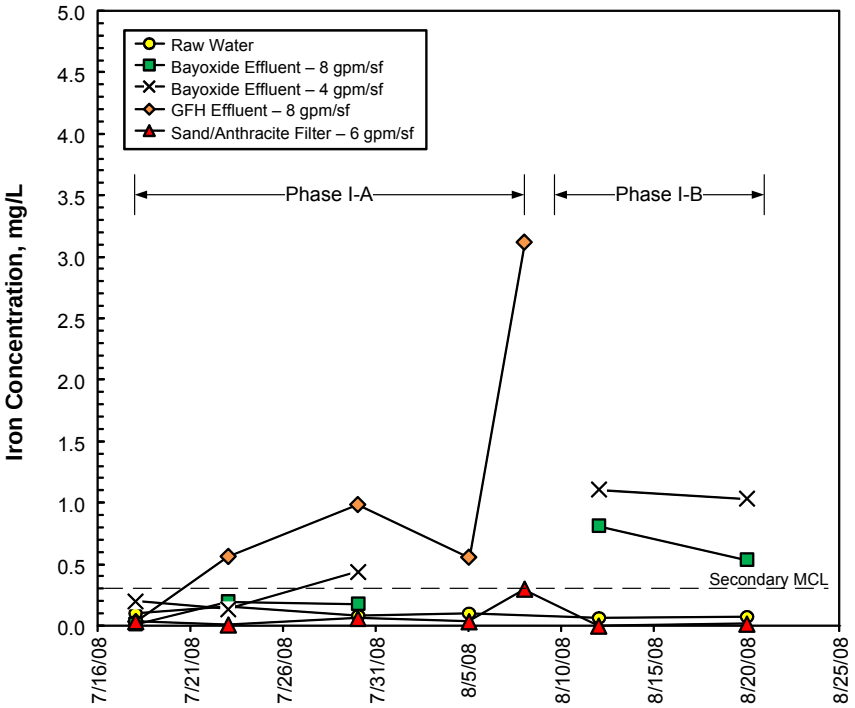

Figure 4 – Iron Removal through the Pilot Filters during Phase I Testing

Figure 5 includes the profiles of the manganese concentrations in the raw water and the effluents of the four filters. As expected, the manganese concentration remained unchanged between the raw water and the effluents of the iron media filters. In fact, the results suggest that the iron media released a small amount of manganese into the water. However, with the addition of chlorine ahead of the sand/anthracite filter, the manganese concentration was reduced from approximately 0.25 mg/L to less than the secondary MCL of 0.05 mg/L. However, at the end of Phase I-B testing, the manganese level in the effluent of the sand/anthracite filter increased to 0.2 mg/L. At that time, the pilot plant was shut down and the media were removed

from the filters in preparation for Phase II testing. It is not clear why the last sample collected from the effluent of the sand/anthracite filter contained an elevated manganese level.

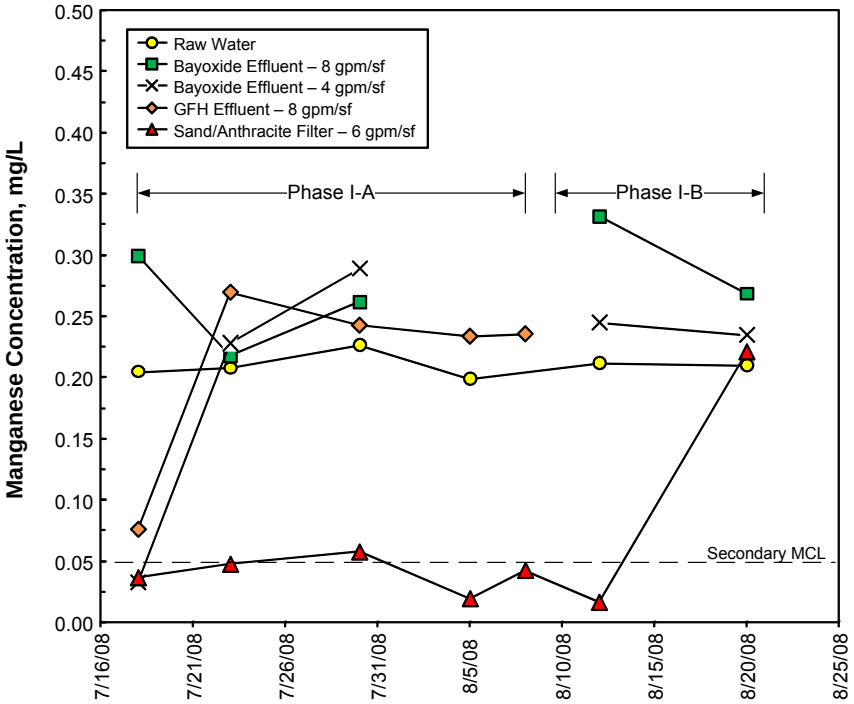

Figure 5 – Manganese Removal through the Pilot Filters during Phase I Testing

Figure 6 shows a plot of the Threshold Odor Number (TON) measured in the effluent of the sand/anthracite filter during Phase I testing. The TON measurements were conducted by the Cater WTP operators. Although the sulfide concentration in the treated water was at or below the detection limit of 0.01 mg/L, the TON levels were high, ranging from 15 to 20. It is not clear what the cause of this high TON value is, but it could be due to the presence of residual elemental sulfur products that remain in the water after treatment. Figure 7 includes a profile of the pH of the raw and filtered waters. The results showed that filtering the water through the iron media resulted in a slight increase in the pH of the water ranging from 0.1 to 0.2 pH units. This is likely due to the chemistry of sulfide oxidation by the iron media.

In summary, the Phase I results indicated that excellent sulfide removal (>99%) can be achieved with the treatment train of iron media filtration followed by chlorination and sand/anthracite filtration. However, several problems were encountered that need to be corrected or further investigated. Primarily, it was suspected that the high filtration rate used during Phase I testing was not sustainable, and thus lower filtration rates were planned for Phase II testing. Also, in addition to testing the two iron medias separately, a third alternative was used which included 50-50 blend of each. It was thought that mixing the two media types in a single filter might overcome some of the operational limitations of each. Finally, during Phase I testing, WQTS operated the pilot plant on an intermittent basis in which a WQTS operator visited the pilot site only two days each week. This proved to be problematic because the pilot plant required daily attention. These limitations were removed during Phase II testing where an on-site operator was hired to conduct daily visits to the pilot plant throughout the testing period.

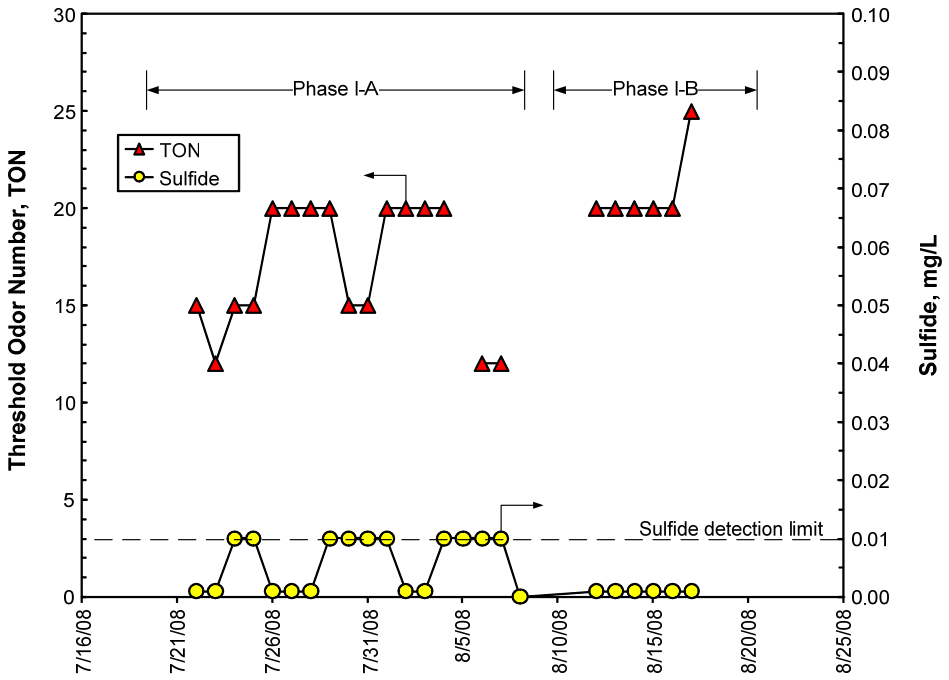

Figure 6 – TON Level in the Effluent of the Sand/Anthracite Filter during Phase I Testing

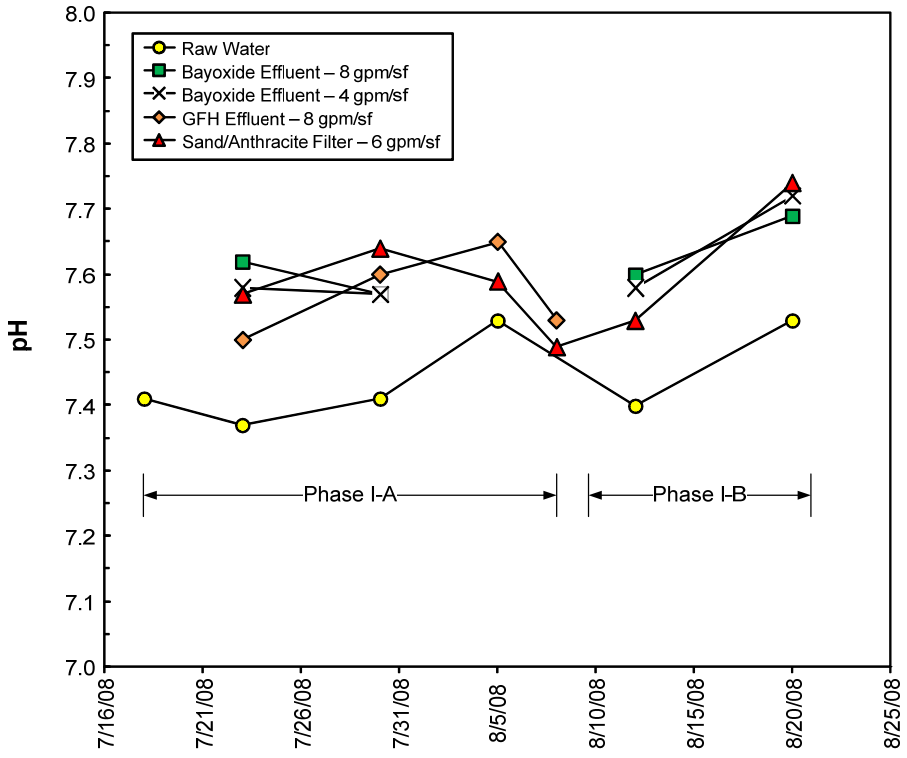

Figure 7 – Water pH in the Effluent of the Pilot Filters during Phase I Testing

3.3 PHASE II RESULTS

The Phase I testing results provided valuable insight into the capabilities and limitations of each media with respect to sulfide removal as well as general operation. Based on those results, modifications to the configuration and operation of the pilot plant were implemented. First, the filtration rate through the iron media was reduced to 4 gpm/sf, and an onsite pilot plant operator was added to the project. While the onsite operator was not at the pilot site full time, he was present at the pilot plant approximately two (2) hrs each day to collect water quality samples and correct any operational problems such as leaks or automatic system shutdowns. This allowed for a steady operation of the pilot plant over a period of three months. There was some brief experimentation with the use of a polymer as a filter aid during the end of Phase II, but this did not improve performance and therefore the results are not included in this report.

3.3.1 Media Depth

Phase I testing results showed that the GFH media tended to break down into smaller particles as water is treated through the filter. We suspect that this is a result of the dissolution of iron from within the pores of the media, which weakened its structure. With each backwash, small pieces of media were washed out of the filter, which resulted in a continuous loss of media from one filter run to the next To minimize this loss during Phase II, the GFH media was backwashed after 120 hrs or if the headloss across the media exceeded 20 ft.

On the other hand, the Bayoxide media manifested a completely opposite behavior. Not only did the media not disintegrate like the GFH media did, but its level in the filter actually increased over time. It is our hypothesis that the rise in the media level is due to the irreversible precipitation of $FeS_{(s)}$ onto the surface of the media. If this precipitate is not dislodged with backwashing, it could cause the media grain size to increase over time, which would result in an increase in the overall media depth. For example, a Bayoxide media filter is operated at 4 gpm/sf, and is used to remove 7 mg/L sulfide from the water. If 50% of the sulfide removed remains on the media after backwashing, we estimate that the media depth would increase by approximately two (2) inches per month. In an attempt to reduce the rate of increase in media depth during Phase II testing, the Bayoxide filter runtime was limited to 48 hrs. The hypothesis was increasing the backwash frequency may reduce the ability of the precipitate to stick to the media and allow for its removal.

The media levels in all three iron-media filters (F2, F3, and F4), and the sand/anthracite filter (F1), were closely monitored and recorded during Phase II testing. The results are shown in Figure 8. During the first two weeks of operation, the GFH media level was maintained around its initial level of approximately 36 inches. However, after this initial period, the media level began to decrease with each backwash until it reached 27 inches after 42 days of operation (end of Phase II-A). This represents a loss of 6 inches per month of continuous operation at 4 gpm/sf. At the 42-day mark, nine inches of media were added to the filter. Again, the media level was somewhat steady for a short period of time, but then began to decrease towards the last two weeks of Phase II-B testing.

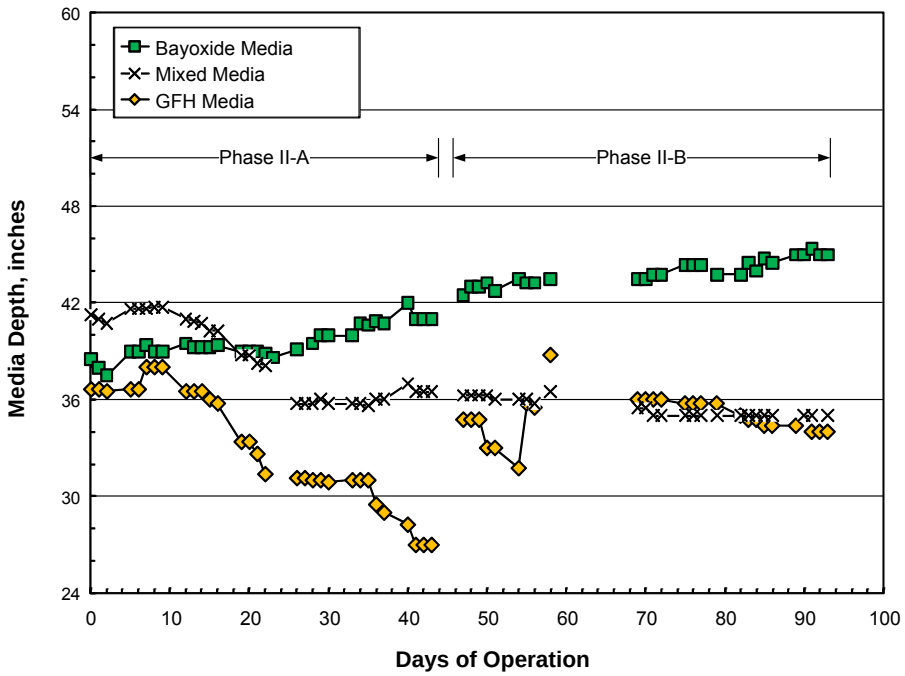

Figure 8 – Iron-Media Depth Changes during Phase II Testing

Figure 8 shows how the Bayoxide media level continuously increased over time. Starting at approximately 38 inches, the media level steadily increased to approximately 47 inches over the 93 days of Phase II testing period. This represents an increase of about 3 inches per month of continuous operation at 4 gpm/sf. The results of the mixed-media filter fell somewhat between the results of the GFH filter and the Bayoxide filter. Initially, the media level in this filter was higher than intended (41 inches), but it decreased to approximately 36 inches in approximately 3 weeks of operation. It then remained at about 36 inches for the majority of the Phase II testing period decreasing to 35 inches towards the end of the test.

To help validate the hypothesis presented earlier about the cause of the rise in the Bayoxide media level during the study, a sample of used Bayoxide media was removed from filter F3 at the end of the pilot study and submitted to MWH Laboratories along with a sample of new Bayoxide media. Both samples were analyzed for Particle Size Distribution. The results are presented in Figure 9. The results seem to support the hypothesis that the size of the media increased significantly through the pilot testing period. While the effective size (d_{10}) of the used media (0.45 mm) was virtually the same as that of the new media (0.42 mm), the used media has much larger grain sizes than the new media. For example, the mean size (d_{50}) of the new media is estimated at 0.76 mm, while the d_{50} of the used media is as large as 1.25 mm; a 64% increase in mean size. It should be cautioned that this observation is based on a single sample of used media and a single sample of new media. Without replicate analyses, there is the possibility that the difference between the two samples analyzed and presented in Figure 9 is a mere random difference between two samples.

Finally, it is noted that the media level in the sand/anthracite filter did not change throughout the testing period.

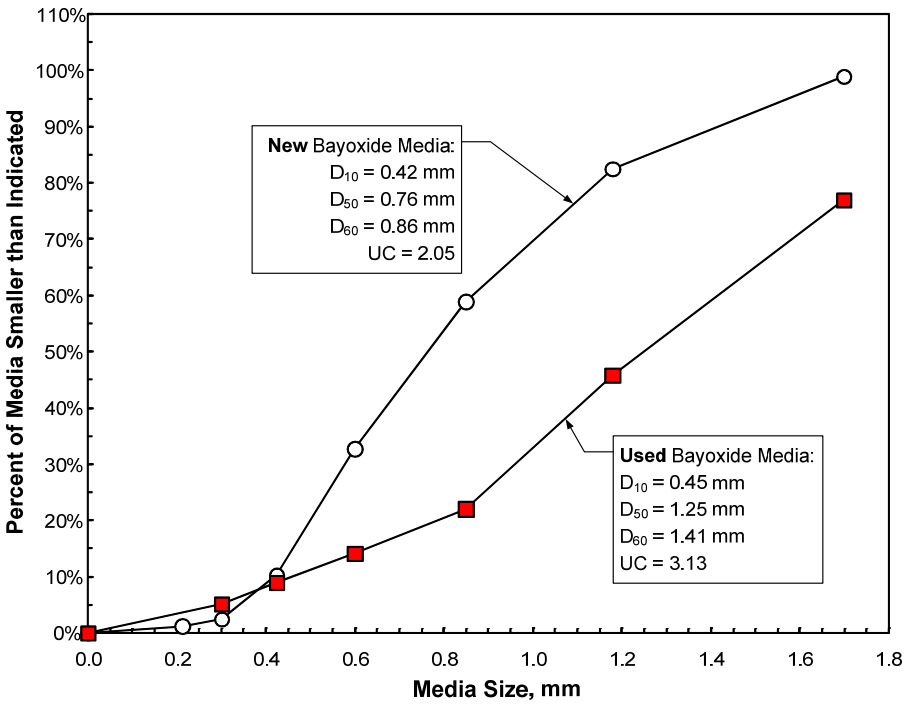

Figure 9 – Grain Size Distribution of New Bayoxide Media and Bayoxide Media Removed from Pilot Filter F3 at the End of Phase II Testing

3.3.2 Water Quality Performance

Figure 10 presents the profile of sulfide, iron, and manganese in the influent water to the pilot plant during Phase II testing. For the first few days of testing, blending of different wells was attempted to achieve a sulfide concentration of approximately 7 mg/L. However, hydraulic restrictions limited the blended value to only 4 mg/L. This was deemed to be too low, and the low sulfide blend water was shut down so that 100% of the pilot inlet water was from Vera Cruz well. This raised the inlet sulfide concentration to approximately 13 mg/L for a period of approximately 3 weeks. Subsequently, the hydraulic restrictions were removed, and blending was resumed to lower the influent sulfide concentration to a range of 6 to 8 mg/L as shown in Figure 10. This range was maintained for the rest of the study. Also shown in Figure 10 are the raw water iron and manganese levels throughout Phase II testing. The iron concentration in the influent water ranged from <0.02 mg/L to approximately 0.1 mg/L, while that of manganese was approximately 0.2 mg/L.

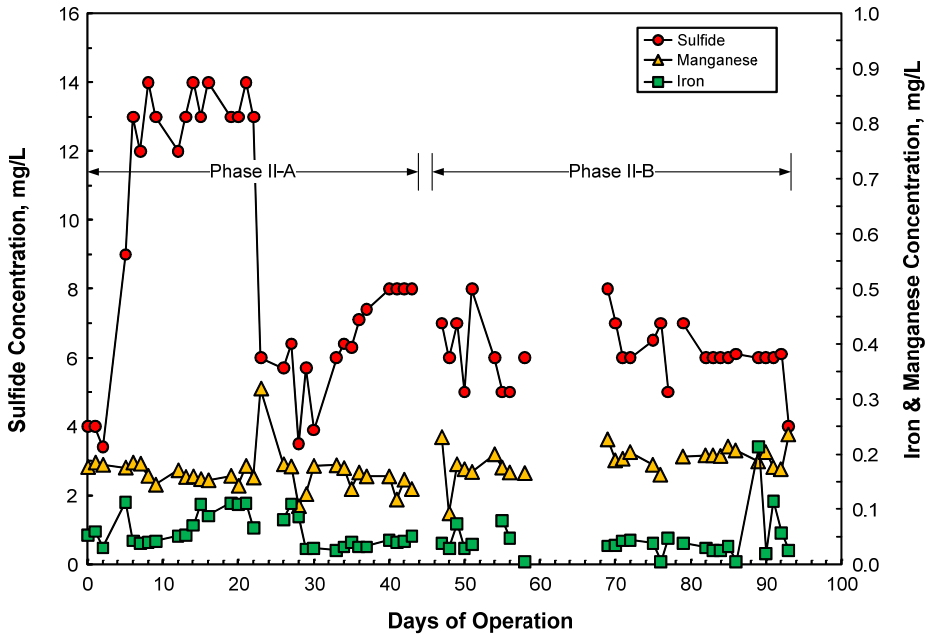

Figure 10 –Raw Water Sulfide, Manganese, & Iron Profiles during Phase II Testing

Figure 11 shows the profiles of the sulfide concentration in the effluent of the three iron media filters. It is noted that a logarithmic scale is used in order to show levels of 10 and 0.01 mg/L on the same plot. Similar to Phase I results, Phase II test also showed that GFH media is capable of higher removal of sulfide compared to Bayoxide media. Even with a sulfide influent concentration of 13 mg/L, the sulfide concentration in the effluent of the GFH media at the start of Phase II testing ranged from <0.01 mg/L to 0.03 mg/L. During this same period, the sulfide concentration in the effluent of the Bayoxide media was approximately 0.2 mg/L; an order of magnitude higher than that in the effluent of the GFH media. At the end of Phase II-A, the GFH media level had decreased by approximately 9 inches, at which time 10 inches of new media was added to the filter. With this change, the sulfide level in the effluent of the GFH media remained between 0.01 mg/L and 0.07 mg/L. On the other hand, the sulfide concentration in the effluent of the Bayoxide media steadily increased from approximately 0.2 mg/L at the start of Phase II testing to as high as 1.6 mg/L at the end of the testing period. However, as discussed later in this section, the Bayoxide media did not need to be replenished during the Phase II testing period. As expected, the sulfide level in the effluent of the mixed media filter (F4) was between the two levels in the effluents of the GFH and Bayoxide media filters. It is interesting to note that towards the end of the testing period, the sulfide level in the mixed media filter was practically identical to that in the effluent of the Bayoxide media filter. This suggests that the GFH portion of the mixed media had lost its effectiveness for sulfide removal at that time. It could also be due to the fact that approximately 6 inches of the 18 inches of GFH media were lost over the course of the Phase II testing period.

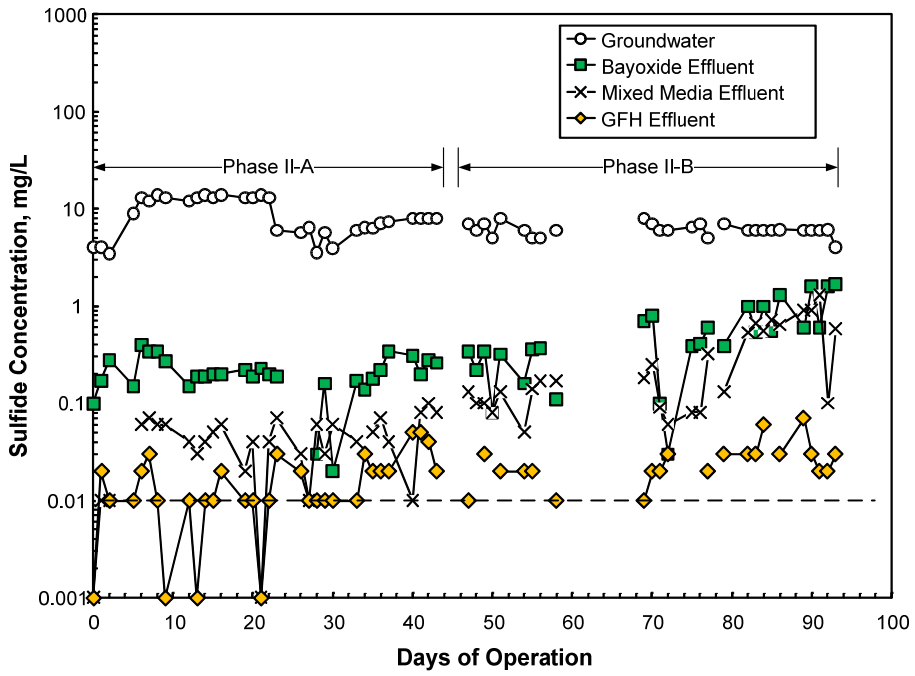

Figure 11 – Sulfide Removal through Iron-Media Filters during Phase II Testing

Figure 12 presents the profile of the final sulfide concentration in the effluent of the sand/anthracite filter throughout Phase II testing. It is noted that the influent to the sand/anthracite filter was the GFH media effluent during Phase II-A, and the Bayoxide media effluent during Phase II-B. Under both configurations, the pilot results show that the sulfide concentration in the effluent of the sand/anthracite filter was at or below the method detection limit of 0.01 mg/L for most of the testing period. Only three samples were measured at 0.02 mg/L, which still represents >99.5% removal of sulfide. It is interesting to note that, even though the sulfide concentration in the sand/anthracite filter influent exceeded 1.0 mg/L towards the end of Phase II-B, the filter effluent sulfide concentration was still <0.01 mg/L.

Figure 13 shows the profile of iron in the raw water and the effluents of all four filters. Due to the disintegration of the GFH media, the iron concentration in the effluent of this media was the highest, reaching greater than 3.5 mg/L at the end of Phase II-A when the GFH media decreased to 27 inches. Even after nine inches of media were added, the effluent iron concentration continued to exceed 3.5 mg/L. On the other hand, the iron concentration in the effluent of the Bayoxide media remained at or below 1.0 mg/L. While the difference in iron levels did not have an impact on the overall removal of sulfide, it did have a significant impact on the sand/anthracite filter runtimes and backwashing frequency as discussed later in this section. Most importantly, Figure 13 shows that the iron level in the effluent of the sand/anthracite filter remained mostly at or below 0.1 mg/L even when the iron concentration in the filter influent increased to more than 3.5 mg/L. It is noted that the secondary MCL for iron is 0.3 mg/L.

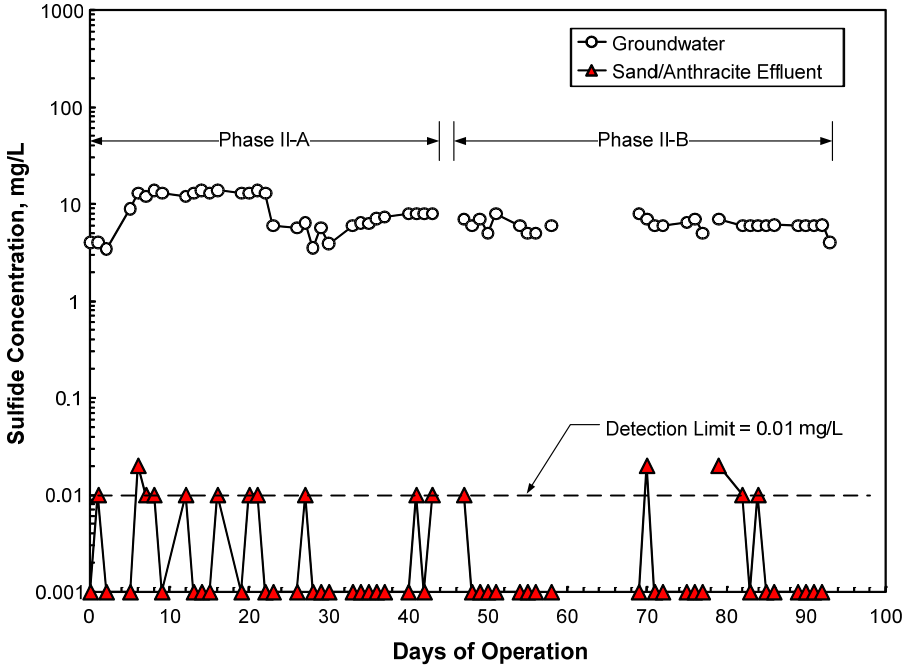

Figure 12 – Overall Sulfide Removal during Phase II Testing

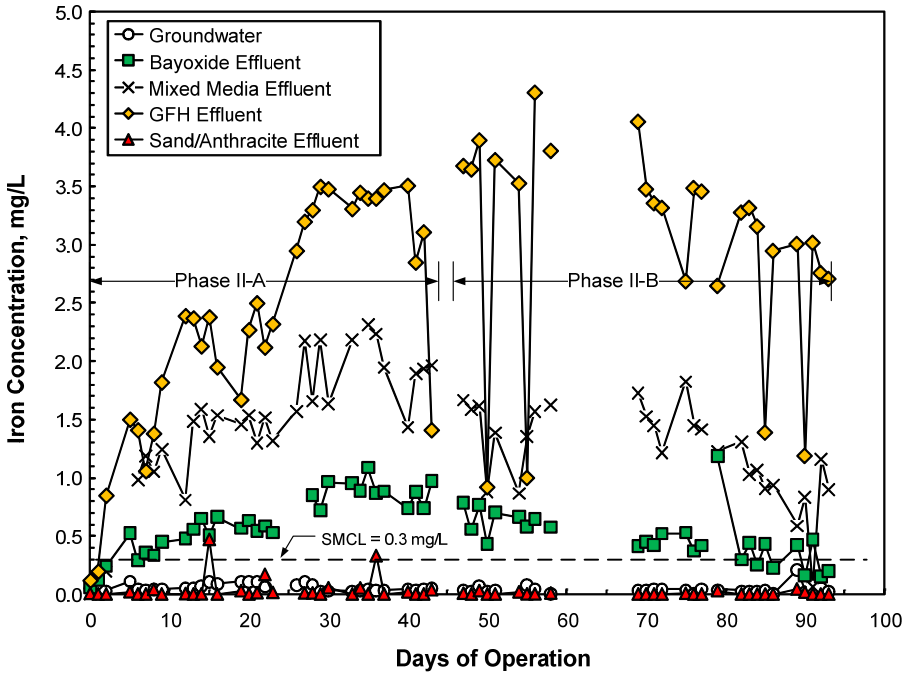

Figure 13 – Iron Release & Removal during Phase II Testing

The third water quality constituent of concern, aside from sulfide and iron, is manganese. Figure 14 shows the profile of manganese in the raw water and the effluents of all four filters. As demonstrated by Phase I results, the iron media did not remove any of the manganese present in the groundwater (which was approximately 0.2 mg/L). However, upon chlorination and filtration through the sand/anthracite filter, the manganese level decreased to less than the secondary MCL of 0.05 mg/L for most of Phase II testing. Figure 14 does show that the manganese level increased well above 0.05 mg/L during the last week of testing. However, this was due to the fact that we were experimenting with the addition of a cationic polymer ahead of the media filter, which proved to cause deterioration, not improvement, in the performance of the filter. Based on the Phase I and II results, it is believed that the filtration of chlorinated water through sand/anthracite will adequately remove manganese from the groundwater.

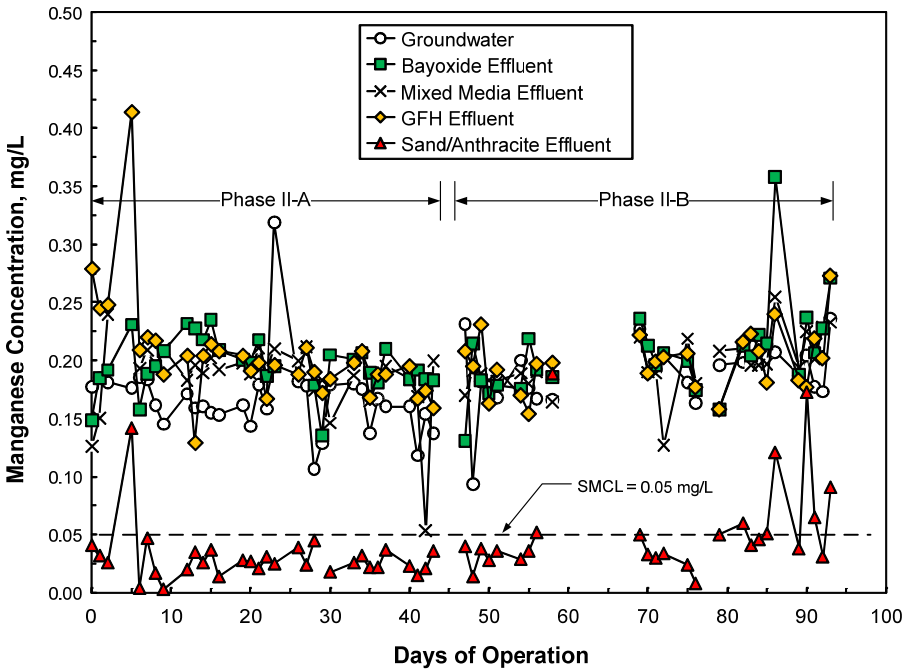

Figure 14 – Manganese Removal during Phase II Testing

Similar to Phase I testing, samples were collected from the sand/anthracite filter effluent water during Phase II testing and analyzed for Threshold Odor Number (TON) by the Cater WTP operators. The results are presented in Figure 15. The TON reported by the operators ranged from 8 to 15 even though the sulfide concentration was predominantly at or below the method detection limit of 0.01 mg/L. There was no other measured constituent in the water that could explain the relatively high TON levels. An informal characterization of the type of taste in the water identified as a “faint burnt match” taste. This suggests that the source of the taste could be an oxidized form of sulfur that was not filtered through the sand/anthracite filter.

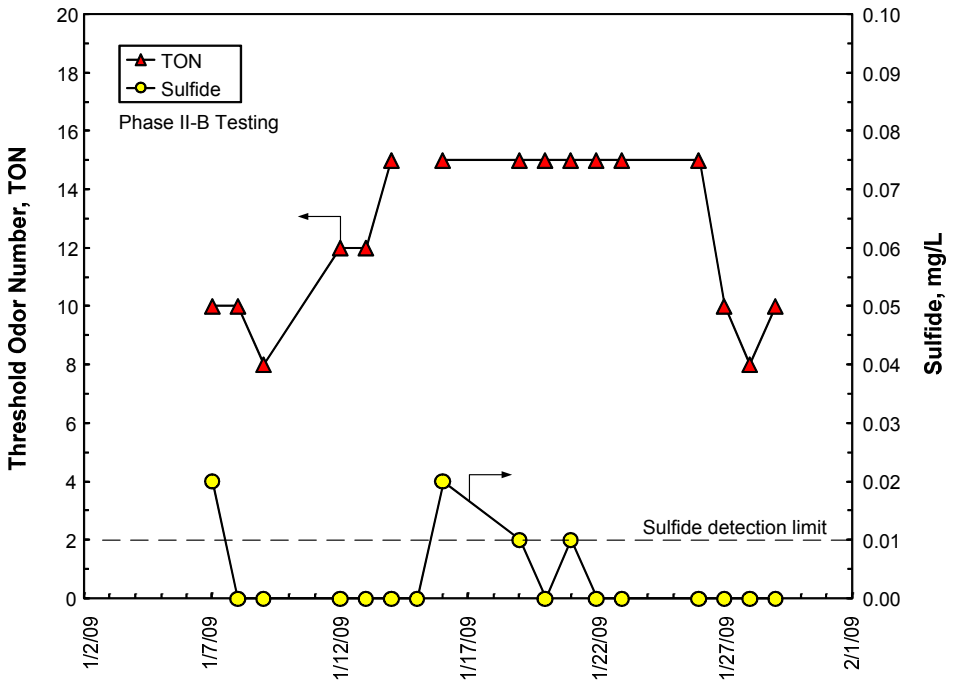

Figure 15 – TON Levels during Phase II-B Testing

As indicated earlier, chlorine was added to the water between the effluent of the iron-media and the influent of the sand/anthracite filter. The general chlorine dose was set at approximately 1.5 mg/L. However, the dose was varied as needed to maintain a target chlorine residual of 1.0 ± 0.5 mg/L in the effluent of the final treated water. Figure 15 presents profiles of the chlorine residual measured in the influent to the sand/anthracite filter immediate downstream of the point of chlorine addition, as well as in the effluent of the sand/anthracite filter throughout Phase II testing. For most of the testing period, the chlorine demand through the filter, which is manifested by the difference in the two profiles plotted in Figure 16, was minimal. However, towards the end of the study, while the influent concentration was approximately 1.5 mg/L, the effluent concentration was non-detectable on a number of days of operation. This could have been caused by a combination of elevated sulfide in the influent of the sand/anthracite filter, as well as the fact that a polymer was being added to the sand/anthracite filter influent at the time.

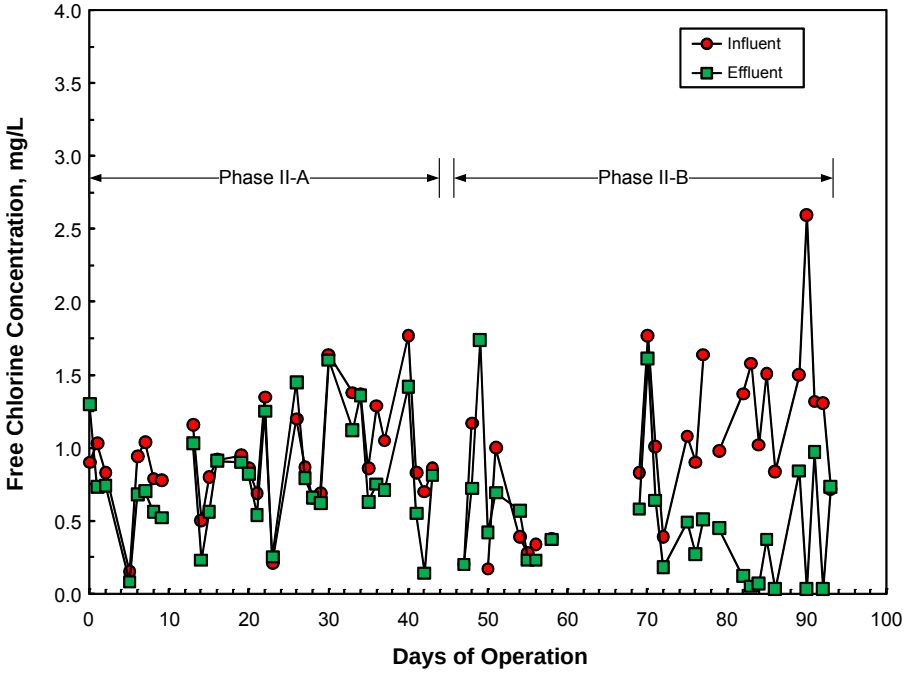

Figure 16 – Chlorine Residual in the Influent & Effluent of the Sand/Anthracite Filter

3.3.3. Other Water Quality Concerns

One of the issues of concern is the potential impact of the large difference in the chemistry of the groundwater versus that of the water currently in the distribution system on the corrosion scales in the distribution system pipes. This is an issue only for unlined iron pipes. Specifically, the oxidation-reduction potential (ORP) and the dissolved oxygen levels in the water are known to play a role in the corrosion of metal surfaces. The mere presence of high sulfide levels in the groundwater suggests that it has very low ORP and DO levels, since these compounds do not occur in well-oxygenated water. During Phase II testing, the ORP and DO levels were measured in the raw and filtered waters and the results are plotted in Figures 17 and 18. The ORP level in the untreated groundwater was approximately -200 mV, while treating through both of the iron media filters increased it only slightly to approximately -100 mV. However, the addition of chlorine to the influent of the sand/anthracite filter greatly increased the ORP level to as high as +600 mV. The line drawn on Figure 17 represents the average ORP measured in the tap water at the Ortega well site, which is representative of the ORP of the water in the distribution system. Because the ORP of the treated water from the pilot plant is higher than that currently in the distribution system, there should be little to no impact on the corrosion chemistry in the distribution system. It is important to note that ORP of water is directly proportional to the levels of oxidants in the water such as chlorine or DO. In the treated water from the pilot plant, the primary cause of the elevated ORP is the chlorine added to the water. Figure 18 shows that the DO level in the treated groundwater remained virtually as low as that in the untreated groundwater (<1.0 mg/L). This is not surprising since there was no action taken to increase the oxygen level in the water through the treatment system. In a typical distribution system containing unlined iron pipes, an elevated ORP promotes the formation of a ferric iron oxide scale on the internal surface of the pipes, which in turn reduces the rate of corrosion of the pipe. Therefore, as long as a chlorine residual is present in the treated water as it travels

through the distribution system, there should be no impact on the corrosion of the pipe surfaces. Nevertheless, the lack of a significant DO level in the treated water is a slight cause of concern.

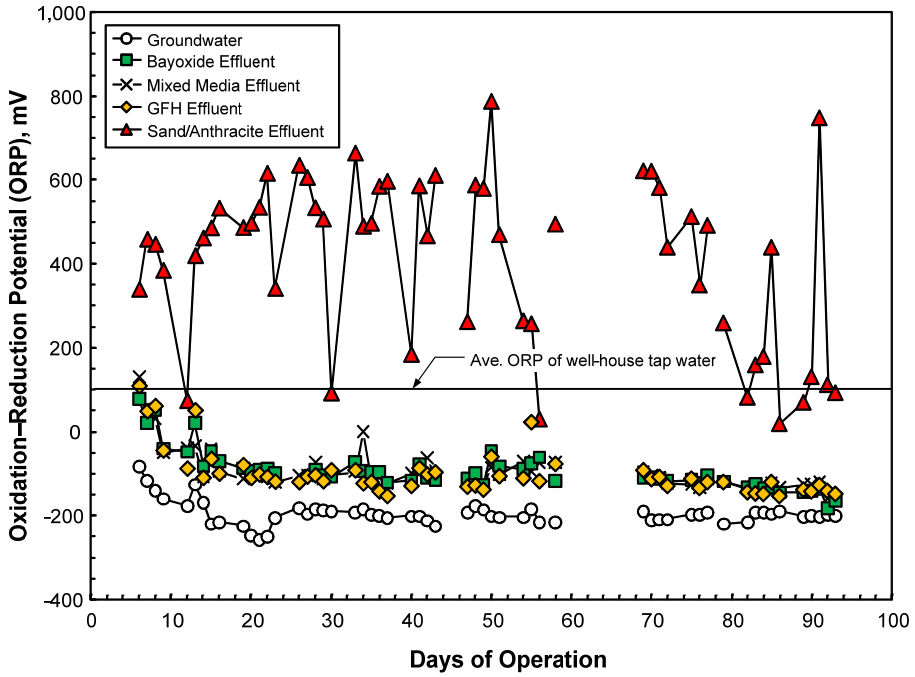

Figure 17 – Oxidation-Reduction Potential Profiles in Raw & Treated Waters

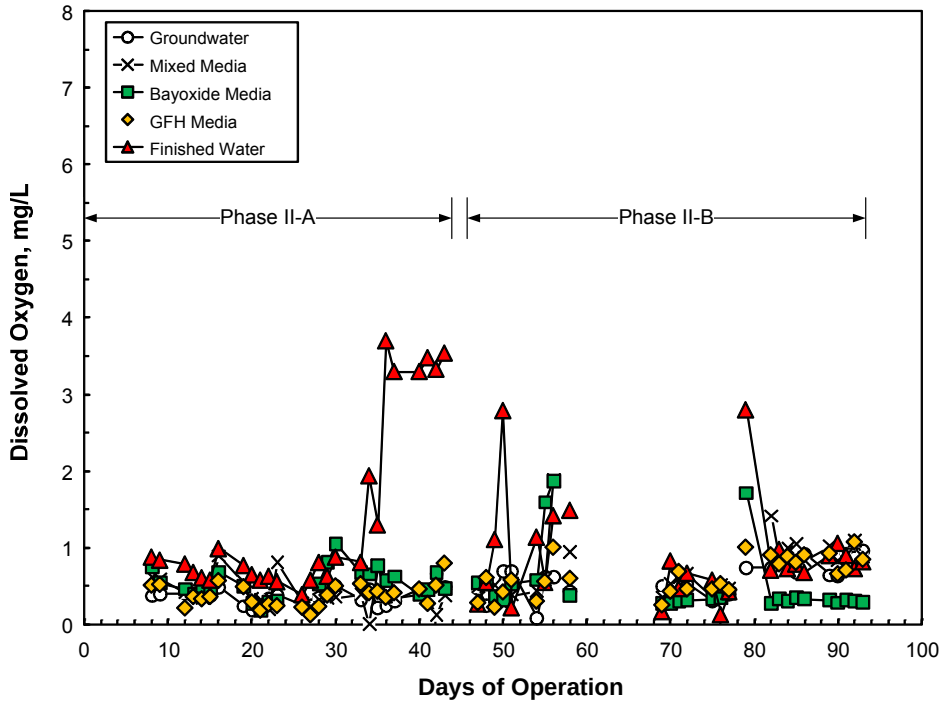

Figure 18 – Dissolved Oxygen (DO) Profiles in Raw & Treated Waters

Finally, Table 5 presents the general water quality of the treated water from the pilot plant during Phase II testing. The first sampling event took place on November 12 when the sand/anthracite filter was operated downstream of the GFH media (Phase II-A). The second sampling event took place on December 17 when the sand/anthracite filter was operated downstream of the Bayoxide media (Phase II-B). In general the water quality of the two samples is the same, but some differences exist. Specifically, the concentrations of some metals (i.e., aluminum, copper, lead, silver, and zinc) in the treated water during Phase II-B were slightly higher than those during Phase II-A. This is likely attributed to the higher metals removal with the GFH media than with the Bayoxide media. Nevertheless, the levels of these metals in the treated water from Phase II-A and Phase II-B were well below their regulatory limits and should be of no concern.

Table 5 – General Treated Water Quality during Phase II Pilot Testing

Parameter	Unit	11/12/2008 (Phase II-A)	12/17/2008 (Phase II-B)
Alkalinity (as $CaCO_3$)	mg/L	284	261
Calcium	mg/L	98.5	96.1
Hardness, Total (as $CaCO_3$)	mg/L	346	346
pH	--	7.5	7.5
TOC	mg/L	0.48	0.94
Aluminum	µg/L	81.0	142
Antimony	µg/L	<0.2	<1.0
Arsenic	µg/L	<0.2	<1.0
Barium	µg/L	78.5	79.8
Cadmium	µg/L	<0.2	<1.0
Copper	µg/L	3.1	6.5
Chromium	µg/L	0.9	<1.0
Iron	µg/L	50	70
Lead	µg/L	0.9	1.6
Manganese	µg/L	4.6	2.4
Mercury	µg/L	<0.2	<0.2
Nickel	µg/L	2.8	2.7
Selenium	µg/L	<0.2	<1.0
Silver	µg/L	1.3	3.7
Thallium	µg/L	<0.2	<1.0
Zinc	µg/L	6.2	13.0
Boron	mg/L	0.1	NA
Cyanide	mg/L	ND	ND
Radon	pCi/L	489 ± 28.0	469 ± 31.5

3.3.4 Filter Runtimes

Thus far, the discussion has focused on the overall water quality performance of the treatment process trains. However, there are several operational aspects to the process train that greatly impact the selection of the iron media to be used, as well as the overall cost of the system. One important parameter is the filter runtime and resulting backwashing frequency. Long runtimes and low backwashing frequency are favorable because they result in less water wastage, as well as lower impact on the City's wastewater collection and treatment systems. This section focuses on the filter runtimes achieved with the GFH media, the Bayoxide media, and the sand/anthracite media filters during Phase II testing.

3.3.4.1 Iron Media Filters

During Phase II, the GFH media filter was operated at a loading rate of four (4) gpm/sf. Due to concerns over loss of media during backwashing, the maximum filter run time was set at 120 hrs, and the maximum headloss was set at 20 ft of water. Turbidity was not used as a backwash trigger because the iron level in the GFH filter effluent was too high and did not lend itself to monitoring by an online turbiditmeter.

Figure 19 shows the headloss buildup through the GFH media over four separate runs during Phase II testing. At the start of the run, the clean-bed headloss was approximately 1.5 ft, but increased up to 20 ft over a period of 60 to 72 hours. While the data suggest that the headloss buildup rate decreased over time, we suspect that this is primarily due to the gradual loss of media in the filter. For the purpose of design, it is reasonable to assume that the runtime through the GFH media filter was 60 hrs to reach the terminal headloss of 20 ft.

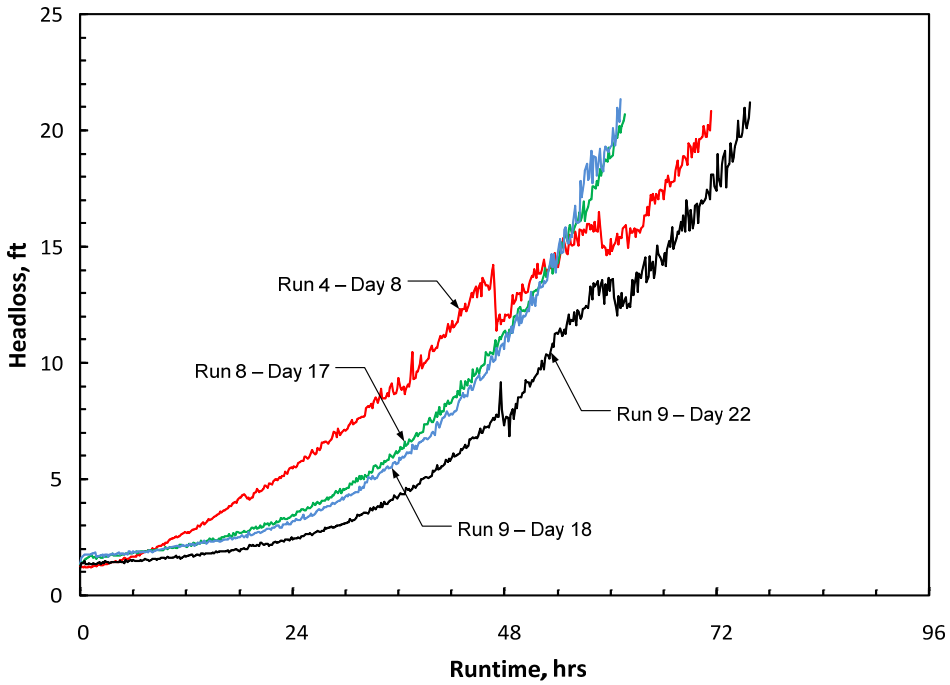

Figure 19 – Headloss Development through the GFH Media Filter over Multiple Runs during Phase II Testing

The Bayoxide media filter was also operated at a loading rate of four (4) gpm/sf during Phase II testing. During Phase I testing, the Bayoxide filter runtimes were long (>120 hrs), which was suspected of contributing to the buildup of non-removable precipitate on the surface of the media, and that may have caused it to increase in level. To address this concern, the maximum runtime for the Bayoxide filter was set at only 48 hrs. Figure 20 shows a plot of the headloss development through the Bayoxide media over multiple runs conducted in Phase II. Similar to the GFH filter, the initial headloss was about 1.5 ft. However, unlike the GFH media filter, the headloss build-up rate was mild, with the headloss reaching only 4 to 5 ft at 48 hrs of operation when each run was terminated. Unfortunately, as presented earlier, the imposition of these short filter runtimes did not prevent the growth of the Bayoxide media over the pilot operation. Therefore, for the full-scale system, these short runs do not need to be imposed. Based on the headloss buildup rate shown in Figure 20, it is likely that the Bayoxide media filters do not need to be backwashed more than once every 120 hrs or longer. In fact, an examination of the Phase I results showed that the Bayoxide media operated at 4 gpm/sf did not reach the terminal headloss of 20 ft till after 240 hrs of operation (10 days). For the purpose of design, we believe that a filter runtime of 120 hrs is a good conservative estimate for the Bayoxide media.

It should be emphasized that not all the GFH or Bayoxide runs had repetitive headloss profiles as those shown in Figures 18 and 19. Mechanical challenges were encountered at numerous times, and they were primarily caused by the fact that the effluent of both filters contained significant levels of iron and particulate matter, which clogged flowmeters, valves, and instruments. It is important to take these challenges into consideration when selecting the mechanical components that will monitor and control the operation of the full-scale system and when developing the inspection and maintenance program for the facilities.

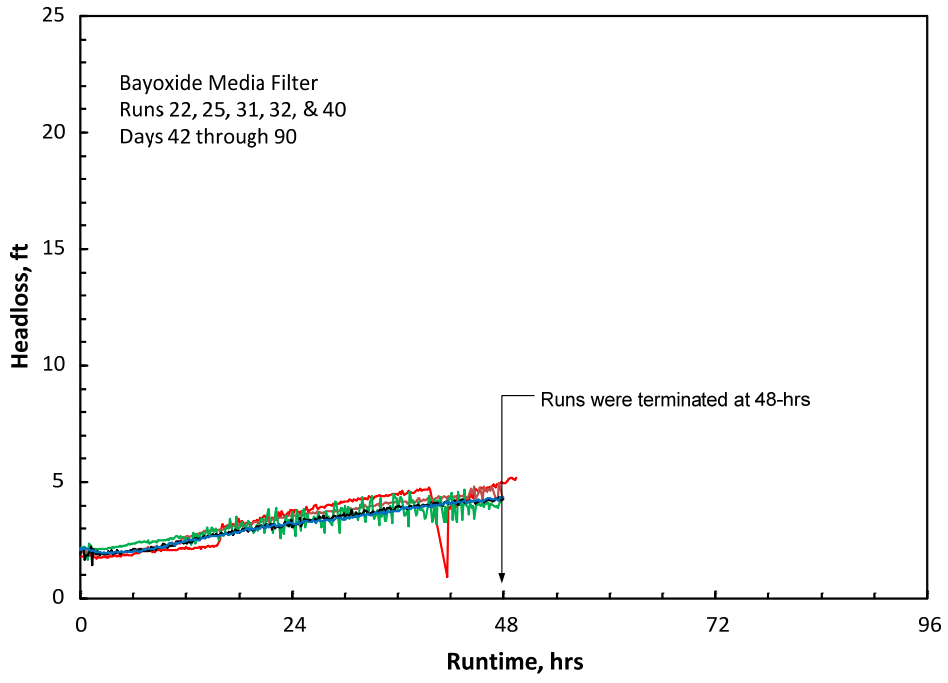

Figure 20 – Headloss Development through the Bayoxide Media Filter over Multiple Runs during Phase II Testing

3.3.4.2 Sand/Anthracite Media Filter

During Phase II testing, the sand/anthracite filter treated the effluent of the GFH filter in Phase II-A, and then the effluent of the Bayoxide filter in Phase II-B. The effluent of the filter was continuously monitored for turbidity, and the filter was set to backwash when the effluent turbidity exceeded 0.2 NTU, or when the runtime reached 96 hours. As discussed earlier, the iron level in the effluent of the GFH media was about three times as much as that in the effluent of the Bayoxide media filter. An analysis of the runtime data for the sand/anthracite filter showed that the iron level in the effluent of the upstream iron-media filter had a significant impact on the runtime of the sand/anthracite filter. Figure 21 summarizes this impact. The plot shows the time to reach 0.2 NTU breakthrough as experienced by the sand/anthracite filter in Phases II-A and II-B. As the testing progressed through II-A, the filter runtime decreased to as low 20 hrs. This is most likely due to the increase in the iron concentration in the influent of the sand/anthracite filter (i.e., effluent of the GFH filter) during this period. However, during Phase II-B testing where the sand/anthracite filter was operated downstream of the Bayoxide media, the filter was always backwashed on time (>96 hrs) and not on turbidity breakthrough. This is clearly due to the low iron level in the effluent of the Bayoxide media compared to the GFH media, in spite of the fact that the sulfide level in the Bayoxide effluent was higher than that in the effluent of the GFH media.

Figure 22 shows a plot of the direct relationship between iron concentration in the sand/anthracite filter and the time for that filter to reach turbidity breakthrough. The plot further illustrates that the higher the iron concentration in the filter influent, the shorter is its run time, which translates into a higher backwashing frequency and larger volume of backwash water production per day of operation.

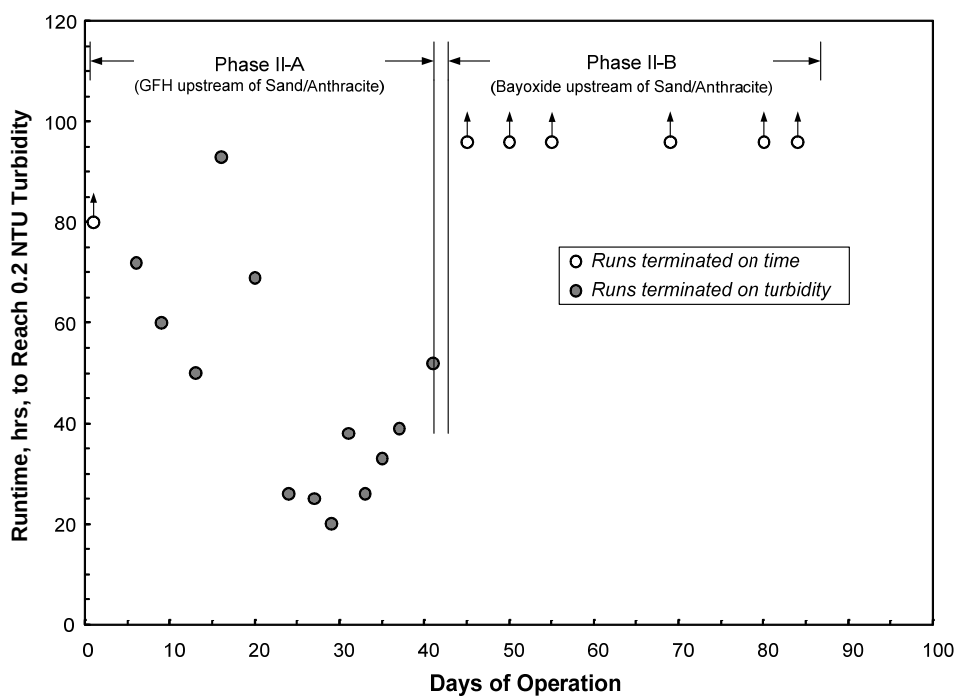

Figure 21 – Sand/Anthracite Filter Runtime to Reach 0.2 NTU in Filter Effluent

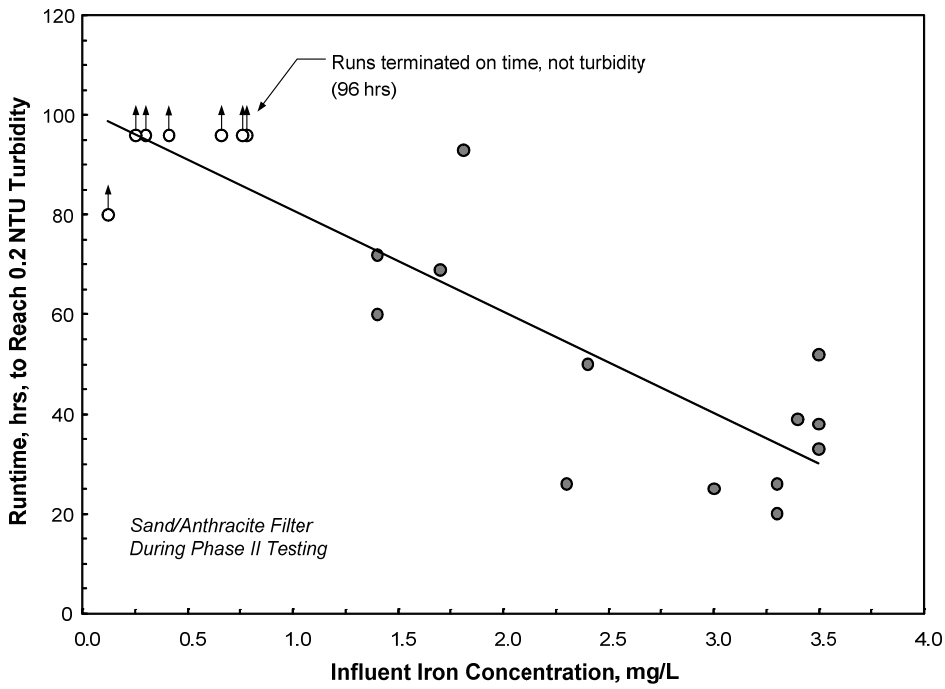

Figure 22 – Sand/Anthracite Filter Runtime during Phase II Testing as a Function of the Iron Concentration in its Influent

The impact of the iron concentration in the influent of the sand/anthracite filter is shown in more detail in Figure 23. This figure includes data from three separate filter runs of the sand/anthracite filter downstream of the GFH media with varying levels of iron in the GFH effluent. In Run 02 (top graph), the iron level in the GFH effluent was 1.3 mg/L, and the results show that turbidity breakthrough was not reached until after 72 hrs of filter run. In Run 04 (middle graph), the iron level in the GFH effluent was approximately 2.3 mg/L, which resulted in turbidity breakthrough after approximately 48 hrs of operation., although the rate of headloss buildup was similar. In Run 08 (bottom graph), the iron level in the GFH effluent was as high as 3.2 mg/L, which shortened the time to turbidity breakthrough to only 24 hours. These results clearly show the impact of the influent iron concentration in the sand/anthracite filter influent on its filter runtime, and consequently its backwashing frequency need. In contrast, Figure 24 shows a plot of the turbidity breakthrough and headloss buildup through the sand/anthracite filter when operated downstream of the Bayoxide media. With the iron concentration in the filter influent at less than 0.5 mg/L, the sand/anthracite filter reached its maximum runtime setpoint of 96 hrs before it reached turbidity breakthrough. It is also noted that the headloss after 96 hours of operation was only 6 to 8 ft. This suggests that the filter could be operated for longer than 96 hours. For the development of design and operational strategies, it is recommended that the average runtime of the sand/anthracite filter downstream of the GFH media be assumed to be 48 hrs, while that downstream of the Bayoxide media be assumed to be 96 hrs.

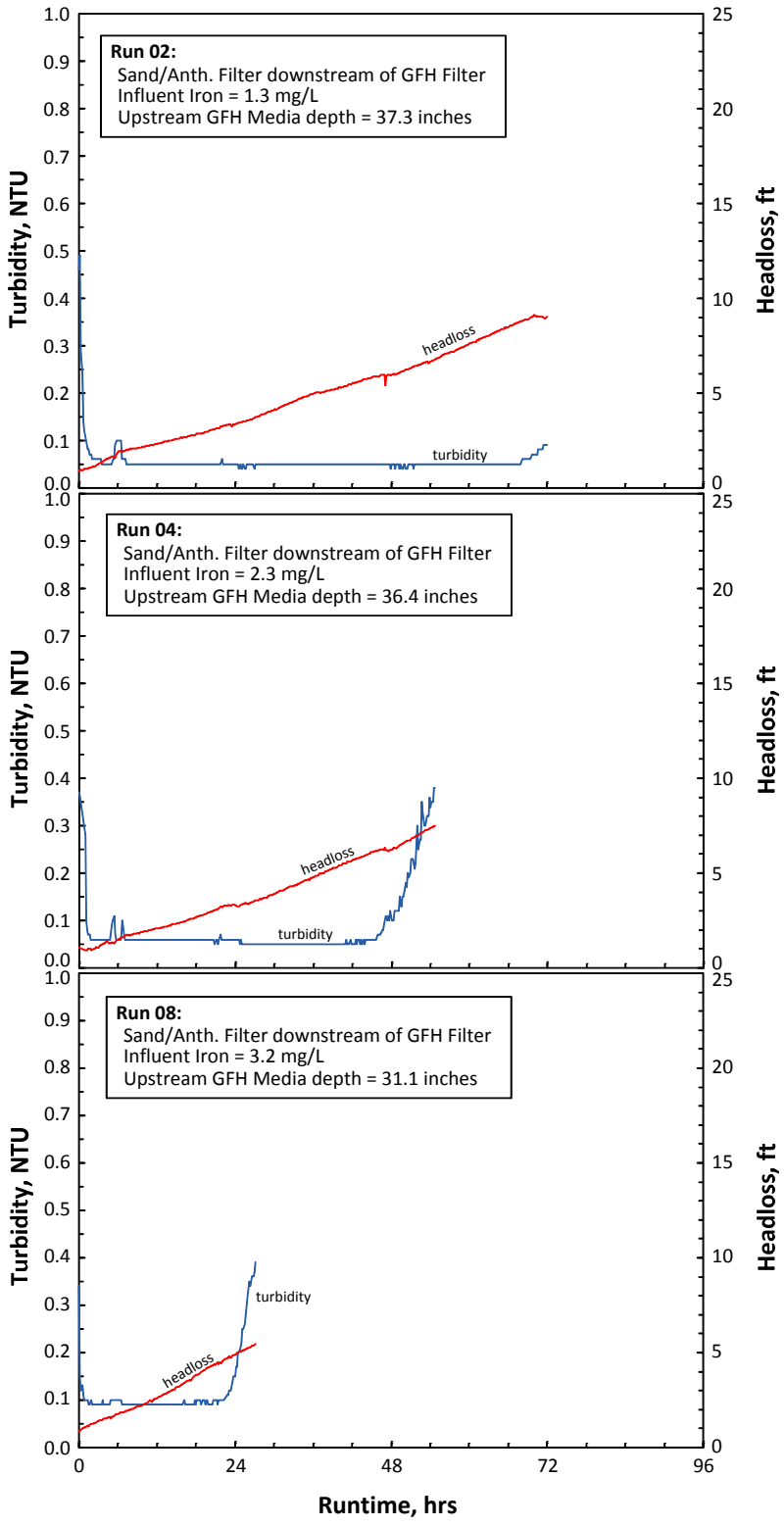

Figure 23 – Turbidity & Headloss Profiles for the Sand/Anthracite Filter during Phase II-A
[Sand/Anthracite Filter Downstream of GFH Filter]

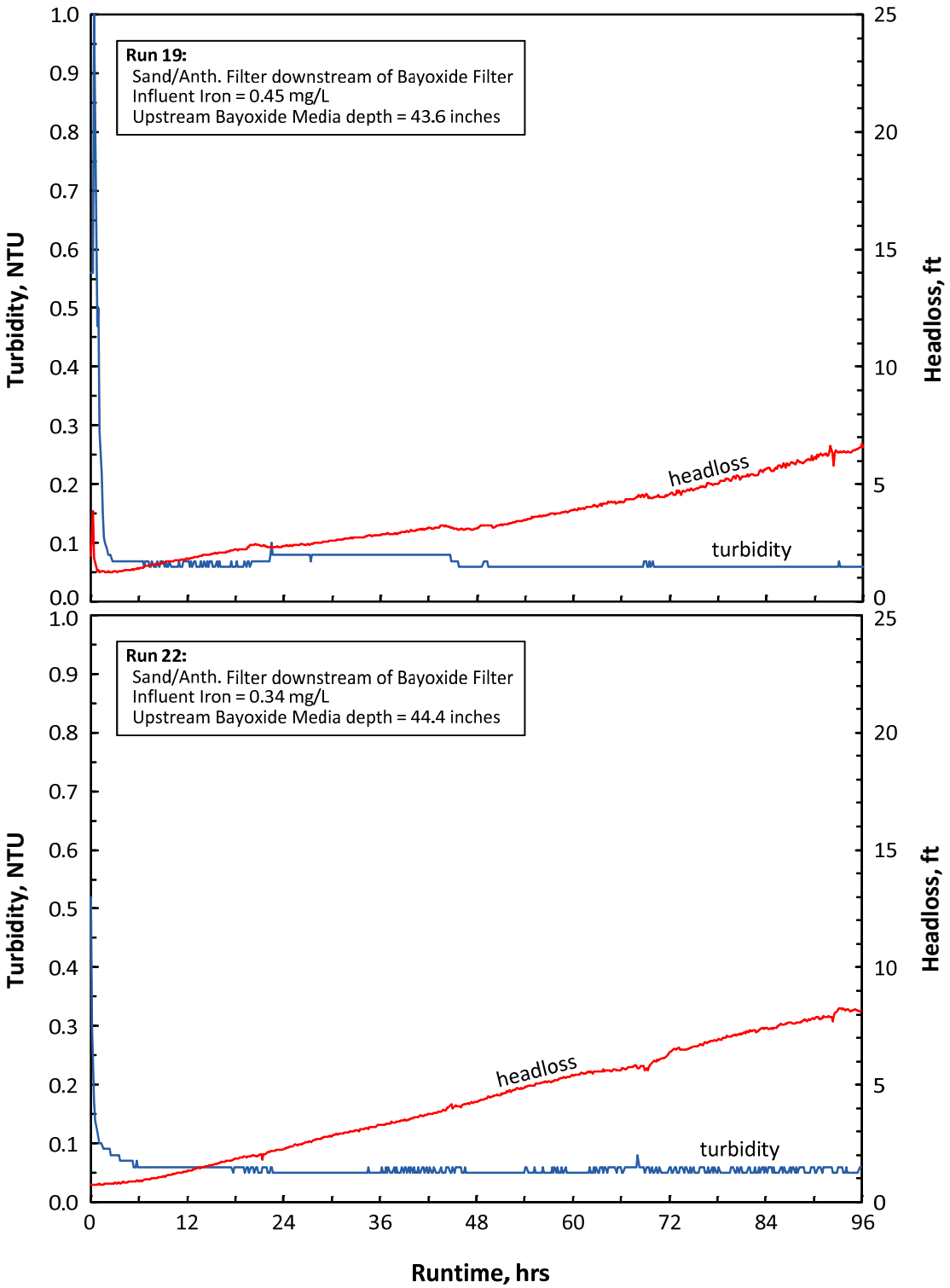

Figure 24 – Turbidity & Headloss Profiles for the Sand/Anthracite Filter during Phase II-B
[Sand/Anthracite Filter Downstream of Bayoxide Filter]

3.3.5 Anticipated Media Usage Rate

One of the important economic parameters for the full-scale plant is the iron-media usage rate. The longer the media lasts between replacements, the lower is the media usage rate, and thus the lower is the plant's annual operating cost. A clear indication for the need to replace the iron media with new media is when the downstream sand/anthracite filter can no longer produce aesthetically acceptable water. While this approach can be used to determine the Bayoxide media life, a different approach could be used for the GFH media because of the continuous loss of media over time.

3.3.5.1 GFH Media Usage Rate

In general, when adsorptive media are used in water treatment, the media is used for a defined period of time, after which it ceases to achieve the required performance goals. At that time, the exhausted media must be removed from the filter and disposed in an appropriate landfill, while new media is added to the filter. However, for GFH, media replacement can be viewed differently. As discussed earlier, the pilot testing results showed that the media level gradually decreased due to the disintegration of media over time. This means that media is gradually removed from the filter during backwashing and is disposed along with the backwash water. If the media in the filter were to be replenished every month with new media, then no media will have to be removed from the filter and disposed in any facility. Using this approach, the media usage rate is simply equal to the media loss rate from the filter.

The pilot testing results showed that the GFH media loss rate was approximately 6 inches per month when the media filter was operated at a constant loading rate of 4 gpm/sf. This translates into a media loss rate of 0.94 ft^3 per acre foot (AF) of water treated. If the lost media were to simply be replenished with new media on a monthly basis, then the GFH media usage rate could also be set at 0.94 ft^3/AF. It is noted that this could be an overestimated value of the media usage rate because it is possible that the entire media may need to be removed from the filter after a certain period of time and replaced with new media. Nevertheless, this unique feature of using GFH media is attractive because it eliminates the need for handling and off-site disposal of used media.

3.3.5.2 Bayoxide Media Usage Rate

The conventional approach is used to determine the media usage rate of the Bayoxide media. During Phase II testing, which lasted for 93 days with a one-week break, the sand/anthracite filter downstream of the Bayoxide media continued to generate acceptable water quality. However, the sulfide level in the Bayoxide media effluent reached as much as 1.5 mg/L, which suggests that the need to replace the Bayoxide media was imminent. While the actual replacement frequency could not be determined, the Bayoxide media life could be conservatively set at 90 days when operated at a loading rate of 4 gpm/sf. This translates into a media usage rate of 1.89 ft^3/AF.

3.3.6 Backwash Water Quality & Quantity

One of the challenging aspects of this treatment system is the handling and disposal of the backwash water generated from the iron-media filter as well as the sand/anthracite media filter. The two options available to the City are as follows:

Option 1 – Clarify the waste backwash water on-site, return the decant water to the head of the plant, and dispose of the settled sludge into the sanitary sewer

Option 2 – Discharge the entire waste backwash water into the sewer

The advantage of the first option is its low(er) water wastage since about 90% of the waste backwash water could be recovered in a clarification system. However, it has two disadvantages: First, it could be very difficult to fit on the already limited space available at the site. Second, adding a clarification process complicates the configuration of the treatment system, and could reduce its operational reliability considering that the treatment plant will be mostly unattended. Nevertheless, during Phase II testing, waste backwash water from each filter was collected on two different occasions and analyzed for various water quality parameters before and after clarification. The results are reported in Table 6. Under each media, the first column, titled "Waste BWW", represents the quality of the mixed waste backwash water as collected, while the second column, titled "Settled Sludge", represents the quality of the settled sludge collected after allowing the waste backwash water to settle for one (1) hour, and decanting the top 90% of the water volume. Therefore, the volume of the settled sludge represents approximately 10% of the overall backwash water volume generated. The values reported in Table 6 provide substantial information on the similarities and differences between the backwash waters from the two iron media and the sand/anthracite filter.

The GFH media waste backwash water contains very high levels of iron (244 mg/L) and sulfur (2,235 mg/L) compared to the backwash waters from the Bayoxide media or the sand/anthracite filter. These levels also manifest themselves in the high Total Suspended Solids (TSS) concentration of 1,050 mg/L and Chemical Oxygen Demand (COD) concentration of 756 mg/L. The levels of these constituents are even higher in the settled sludge from the GFH backwash water, which contains iron at 2,305 mg/L, TSS at 6,364 mg/L, COD at 3,255 mg/L, and sulfur at 8,525 mg/L. By contrast, the waste backwash water from the Bayoxide filter contained iron at only 6.8 mg/L, TSS at 15 mg/L, sulfur at 78 mg/L, and COD at 14 mg/L. Even in the settled sludge from the Bayoxide backwash water, the levels of iron (118 mg/L), TSS (104 mg/L), sulfur (290 mg/L), and COD (64 mg/L) were substantially lower than those in the settled sludge from the backwash water of the GFH media. These comparisons suggest that the use of the GFH media will likely have a far more detrimental effect on the City's wastewater collection system and treatment plant. Impacts of the different residual streams will be further discussed in the preliminary design report.

Table 6 also demonstrates how the GFH media achieves greater metals removal than the Bayoxide media. However, from the perspective of the quality of the backwash water, elevated levels of heavy metals in the backwash water pose a greater problem for the wastewater treatment plant. Specifically, the levels of aluminum, barium, chromium, copper, and zinc are significantly higher in the waste backwash water from the GFH media than in that from the Bayoxide media.

Table 6 – Quality of Unclarified Waste Backwash Water (BWW) and Settled Waste Backwash Water Sludge Collected during Phase II Pilot Testing

Parameter	Unit	GFH Media		Bayoxide Media		Sand/Anthracite (after GFH)		Sand/Anthracite (after Bayoxide)	
		Waste BWW	Settled Sludge	Waste BWW	Settled Sludge	Waste BWW	Settled Sludge	Waste BWW	Settled Sludge
TSS	mg/L	1,050	6,364	15	104	168	3,110	138	1,902
COD	mg/L	756	3,255	14	64	16	220	19	322
Sulfate	mg/L	143	162	120	119	112	109	113	5.6
Chloride	mg/L	42	45	45	43	49	44	48	2
Nitrate-N	mg/L	4.6	4.7	4.8	4.7	1.0	4.8	<0.1	<0.1
Nitrite-N	mg/L	<0.1	<0.1	<0.1	0.11	<0.1	3.85	<0.1	<0.1
Bromide	mg/L	<0.1	<0.1	0.29	0.28	<0.1	<0.1	<0.1	<0.1
Sodium	mg/L	47	46	43	48	45	44	48	49
Potassium	mg/L	2.6	3.0	1.7	2.3	1.8	2.3	1.7	2.3
Iron	mg/L	244	2,305	6.8	118	67	969	44	541
Manganese	mg/L	0.22	1.0	0.14	0.28	3.5	51	5.4	66
Metals									
Aluminum	µg/L	326	2,585	41	437	70	717	171	639
Antimony	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Arsenic	µg/L	2.6	19	<1.0	4.9	5.9	87	2.9	32
Barium	µg/L	114	1,260	73	766	205	3,030	193	2,430
Cadmium	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Copper	µg/L	13.6	101	2.2	11	5.8	38	8.8	31
Chromium	µg/L	19	198	1.1	18	2	21	4.8	54.1
Lead	µg/L	2.1	11	<1.0	6.85	<1.0	13	2	11.4
Mercury	µg/L	<0.2	0.2	<0.2	0.2	<0.2	<0.2	<0.2	<0.2
Nickel	µg/L	23	217	2.5	18	3.7	26	4	23
Selenium	µg/L	1.2	2.9	<1.0	<1.0	<1.0	7	<1.0	3.2
Silver	µg/L	1.5	3	1.4	2.2	12	2	2.6	2.5
Thallium	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Zinc	µg/L	35	710	15	446	17	506	15	506
Other									
Boron	mg/L	<0.1	<0.1	0.1	<0.1	0.1	0.1	0.1	0.1
Cyanide	µg/L	<4	<4	<4	<4	<4	<4	<4	<4
Total Sulfide	mg/L	0.8	20	<0.1	<0.1	<0.1	0.4	<0.1	1.4
Sulfur	mg/L	2,235	8,525	78	290	36	41	38	45

Note: The results reported for the GFH media are the average of the results from two sampling events conducted on 12/03/08 and 12/18/08. The results reported for the Bayoxide media are the average of the results from two sampling events conducted on 12/03/08 and 12/16/08.

Table 6 also compares the quality of the waste backwash water of the sand/anthracite filter when operated downstream of the GFH media to that when operated downstream of the Bayoxide media. As expected, due to the high iron concentration in the effluent of the GFH media, the amount of iron in the filter backwash water was significantly higher when it treated GFH media effluent compared to when it treated Bayoxide media effluent. The difference is even more significant when one considers the fact that the sand/anthracite runtime downstream of the GFH media was less than half as long as its runtime downstream of the Bayoxide media. This means that, when operated downstream of the Bayoxide media, the sand/anthracite filter accumulated solids for at least twice as long as it did when operated downstream of the GFH media. Under the same influent solids concentration, the longer filter runtime would have resulted in higher solids content in the backwash water. One constituent whose concentration in the sand/anthracite backwash water is higher than its concentration in the GFH or Bayoxide backwash water is manganese. The manganese concentration in the waste backwash water from the sand/anthracite filter was 3.5 mg/L downstream of the GFH media and 5.8 mg/L downstream of the Bayoxide media. This is expected since all the manganese present in the raw water was removed on the sand/anthracite filter and not on the GFH or the Bayoxide media (see Figure 14).

In addition to the mixed backwash water analysis and the settled sludge analysis, the decant water from the backwash waters reported in Table 6 were also analyzed for TSS, iron, manganese, and total sulfide. The results are reported in Table 7. The analytical results clearly indicate that the quality of the settled waste backwash water from the GFH media was worse than that of the settled waste backwash water from the Bayoxide media. Specifically, the TSS concentration in the settled GFH backwash water was 20 mg/L while that in the settled Bayoxide backwash water was only 8.0 mg/L. Similarly, the iron concentration in the settled GFH backwash water was 8.0 mg/L while that in the settled Bayoxide backwash water was only 1.2 mg/L. This is reflective of the presence of a high concentration of iron fines generated from the breakdown of the GFH media over time. While most of these fines settled into the sludge portion, a significant concentration of them remained suspended in the clarified water. If this water is returned to the head of the plant, it could have a negative impact on the performance and/or efficiency of the overall treatment system.

Table 7 – Quality of Decant Backwash Water Collected during Phase II Pilot Testing

Parameter	Unit	GFH	Bayoxide	Sand/Anthracite (after GFH)	Sand/Anthracite (after Bayoxide)
TSS	mg/L	20	8.0	<1.0	<1.0
Iron	mg/L	8.0	1.2	1.3	2.1
Manganese	mg/L	0.142	0.145	0.059	0.271
Total Sulfide	mg/L	<0.1	<0.1	<0.1	<0.1

Note: The results reported for the GFH media are the average of the results from two sampling events conducted on 12/03/08 and 12/18/08. The results reported for the Bayoxide media are the average of the results from two sampling events conducted on 12/03/08 and 12/16/08.

As indicated earlier, the two options available for handling the waste backwash water are to either clarify it on site, and discharge the settled sludge to the sewer, or discharge the entire waste backwash water to the sewer. Assuming a treatment plant production rate of 3,500 gpm, Table 8 presents a preliminary analysis of the backwash water production rate based on the

Unit Filter Backwash Volume (UFBV) of 180 gal/sf used at the pilot plant. The table includes the overall backwash water production rate for two treatment trains: The first includes a GFH filter followed by a sand/anthracite filter, while the second includes a Bayoxide filter followed by a sand/anthracite filter. Based on the pilot testing results, the GFH-based treatment train could experience a total of 3.3% wastage rate, while the Bayoxide-based treatment train could experience a total wastage rate of 1.7%. Wastage rate is the percent ratio of waste backwash water generated to groundwater treated through the treatment system. For example, if the plant treats 3,500 gpm of groundwater, the GFH-based treatment train is expected to generate 168,000 gpd of waste backwash water, while the Bayoxide-based treatment train would generate 84,000 gpd of waste backwash water. If the entire waste backwash water is to be discharged continuously into the sewer, the total flowrate from the GFH-based treatment train will be approximately 117 gpm, while that from the Bayoxide-based treatment system will be approximately 58 gpm. This large difference in the required sewer capacity will be a significant factor in the selection of the appropriate iron media to use at the full-scale plant.

Table 8 – Backwash Water Quantity from the Two Potential Treatment Trains: (1) GFH – Sand/Anthracite & (2) Bayoxide – Sand/Anthracite

		GFH – Sand/Anthracite			Bayoxide – Sand/Anthracite		
Parameter	**Unit**	**GFH**	**Filter**	**Combined**	**Bayoxide**	**Filter**	**Combined**
UFBV	gal/sf	180	180		180	180	
UFRV	gal/sf	14,400	8,640		28,800	17,280	
Efficiency	%	98.75%	97.92%	96.67%	99.38%	98.96%	98.33%
Wastage Rate	%	1.3%	2.08%	3.3%	0.63%	1.04%	1.7%
Plant Flow	gpm	3,500	3,500	3,500	3,500	3,500	3,500
BWW Production	gal/day	63,000	105,000	168,000	31,500	52,500	84,000
BWW Flow	gpm	44	73	117	22	36	58

4.0 – SUMMARY & RECOMMENDATIONS

This report presents the results of a pilot study conducted to evaluate the use of iron-media filtration followed by sand/anthracite filtration to remove elevated levels of sulfide, manganese, and iron from the City of Santa Barbara's Ortega wells. A summary of the report content is presented in this section, along with suggested recommendations for full-scale design and implementation.

4.1 TREATMENT PROCESS BASIS AND CONFIGURATION

The chemistry of iron and sulfide is well understood, and is commonly used to control sulfide odors in wastewater collection systems. Granular iron media was recently introduced into the drinking water market. Specifically, two iron media, GFH™ and Bayoxide™, sold by Siemens USA and SevernTrent Water Services, respectively, have gained popularity for the removal of arsenic and other heavy metals from water. These media are made from various oxides of iron such as goethite (α-FeOOH), ferric hydroxide ($Fe[OH]_3$), and akaganéite (β-FeOOH). If the water passing through a packed bed of the iron media contains sulfide, the ferric iron and the sulfide will undergo the following oxidation-reduction reaction:

$$2Fe^{3+} + 3S^{2-} \longrightarrow S^{o} + 2FeS_{(s)} \qquad (6)$$

The above reaction states that two ferric iron (Fe^{3+}) molecules will dissolve from the media, react with three molecules of sulfide (S^{2-}) and result in the precipitation of one molecule of elemental sulfur (S^{o}) and two molecules of ferrous sulfide (FeS). The two precipitates formed will either settle onto the surface of the iron media, or remain in suspension. For this reason, a downstream granular media filter is required to capture this remaining precipitate. In the case of the City's groundwater, which also contains elevated levels of manganese, the downstream media filter provides the surface necessary for the removal of manganese from the water. To accomplish this removal, a low dose of chlorine upstream of the media filter is required. The resulting configuration of the overall treatment system is presented in Figure 25 below. This treatment train was evaluated at the pilot plant.

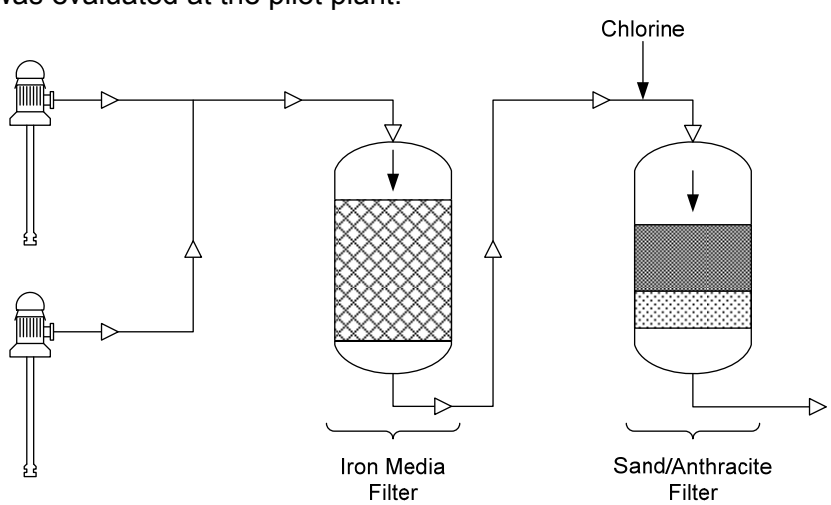

Figure 25 – General Schematic of the Ortega Treatment System

4.2 GENERAL TESTING PLAN

The pilot testing effort focused on evaluating two iron media (GFH™ and Bayoxide™) followed by a conventional sand/anthracite media filter (similar to the configuration of the treatment system in Figure 25). The pilot unit included three parallel iron media filters followed by one sand/anthracite filter. The iron media filters contained 36 inches of media. The sand/anthracite filter contained 24 inches of anthracite over 12 inches of sand. Testing was conducted in two Phases. During Phase I, which extended for approximately 30 days, preliminary information was gathered on the performance of the media. During this phase, the iron media filters were operated at 8 gpm/sf, while the sand/anthracite filter was operated at 6 gpm/sf. Based on the Phase I results, the pilot setup was slightly modified, and Phase II was initiated. Phase II testing was conducted over a period of 90 days which provided good information on the anticipated performance of the iron media. During Phase II testing, the iron media filters were operated at 4 gpm/sf and the sand/anthracite filter was operated at 3 gpm/sf.

During both phases of testing, a large number of samples was collected from the raw water, the effluent of each iron media filter, and the effluent of the sand/anthracite filter. These samples were analyzed for sulfide, iron, manganese, and a number of other water quality constituents. Treated water samples were also collected and analyzed for Threshold Odor Number (TON), which is a final indicator of the aesthetic quality of the water generated by the treatment system. In addition, since the backwash water from the full-scale system is planned to be discharged to the sanitary sewer, the backwash water from the iron media filters and the sand/anthracite filter was collected on two separate occasions and analyzed for a large number of water quality parameters in order to assess the impact of discharging this backwash water on the wastewater collection and treatment systems.

4.3 SUMMARY OF TECHNICAL RESULTS

4.3.1 Process Performance

During Phase I and Phase II testing, the pilot influent water contained approximately 6 to 10 mg/L sulfide, 0.2 mg/L manganese, and 0.1 mg/L dissolved iron. The following are the critical results of the study:

1. The GFH media achieved higher sulfide removal than the Bayoxide media. Specifically, the GFH media reduced the sulfide level to a range of 0.01 mg/L to 0.1 mg/L, while the Bayoxide media reduced the sulfide level to a range of 0.1 to 1 mg/L.

2. The chlorinated sand/anthracite filter was operated downstream of the GFH media for a portion of each Phase of testing, and then downstream of the Bayoxide media during the remaining portions. Under either configuration, filtration through the chlorinated sand/anthracite filter further reduced the sulfide concentration to a level at or below the method detection limit of 0.01 mg/L. Therefore, whenever the two-stage filtration process was used, the finished water sulfide levels were quite low regardless of iron media type.

3. While no manganese removal was achieved through either iron media, the manganese present in the raw water was reduced to <0.05 mg/L as the water passed through the

chlorinated sand/anthracite filter. This is another reason for the having the chlorinated sand/anthracite filter downstream of the iron media filters.

4. Unfortunately, while the sulfide level in the treated water was at or below the method detection limit of 0.01 mg/L, the TON level remained between 10 and 20, which is significantly higher than the secondary MCL of 3. However, this still represents a very large improvement in the aesthetic quality of the water.

5. While both media achieved substantial sulfide removal, the impact of the iron-sulfide reaction on the structural integrity of the two media varied greatly. The GFH media slowly disintegrated into smaller media as the reaction between the iron and the sulfide proceeded. When the media was backwashed, the smaller media was washed out of the filter resulting in progressive loss of media with backwashing. When operated at 4 gpm/sf and backwashed every 60 hours, the GFH media level decreased by approximately 6 inches per month.

6. On the other hand, the Bayoxide media level continuously increased over the course of the study. At the loading rate of 4 gpm/sf and a runtime of 48 hrs between backwashes, the Bayoxide media level increased at a rate of approximately 3 inches per month. Size analysis of the Bayoxide media at the end of the study showed that the media size increased significantly over the course of the study. For example, while the mean size (d_{50}) of the new media was measured at 0.76 mm, the d_{50} of the used media was measured at 1.25 mm; a 64% increase in mean size. It is suspected that the cause of this increase in size is the irreversible precipitation of iron-sulfide (*FeS*) onto the surface of the media.

A mixed-media filter bed was tested (half GFH and half Bayoxide), but this combination did not produce sufficient benefits to warrant further analysis.

4.3.2 Runtime & Backwashing Frequency

Each iron media filter was monitored for runtime and headloss buildup rate. The sand/anthracite filter was monitored for runtime, headloss, and effluent turbidity. The information collected was used to determine the anticipated backwash frequency of each filter. The following are the main observations made:

1. The GFH media reached the terminal headloss of 20 ft at approximately 60 hrs of operation when the media level was about 36 inches. As the media level decreased, the runtime to terminal headloss increased to approximately 72 hours, but sulfide removal performance suffered.

2. During the steady operation of Phase II testing, the Bayoxide media was backwashed every 48 hrs with the hope of reducing the irreversible buildup on the media. After 48 hrs of operation, the headloss through the media was only 4 to 5 ft. It is anticipated that the media runtime could be extended to 120 hrs before the terminal headloss is reached.

3. The sand/anthracite filter runtime greatly depended on the upstream media used. The disintegration of the GFH media during operation released increasingly high levels of iron into its effluent. This resulted in turbidity breakthrough in the effluent of the sand/anthracite filter after only 24 hrs when the iron level in the GFH effluent increased to over 3 mg/L.

However, since the iron level in the effluent of the Bayoxide media was always less than 1 mg/L, the sand/anthracite filter did not reach turbidity breakthrough or terminal headloss before the filter run was terminated at 96 hrs of operation.

4.3.3 Iron Media Usage Rate

The media usage rate, expressed in ft^3/AF determines the annual media replacement cost. The higher the media usage rate, the lower is the annual cost of media replacement. Based on the results of the pilot study, the following observations are made:

1. The pilot results showed that the GFH media was gradually lost from the filter due to its disintegration over time. Therefore, instead of being completely replaced with new media after a set period of time, the GFH media could be gradually replenished as it is being lost from the filter. Based on the media loss rate recorded during pilot testing, the GFH media usage rate is projected at 0.94 ft^3/AF. If the full-scale plant treats a continuous flow of 3,500 gpm, approximately 438 ft^3 of GFH media will be added to the treatment vessels every month. It should be noted that this approach may not prove sustainable in the long run, and the City may determine that, occasionally, the entire media will need to be replaced with new media. This increases the overall media use rate.

2. Determining an accurate Bayoxide media usage rate is not possible because the end of the media life was not reached during the study. However, a conservative estimate of the media usage rate was determined at 1.89 ft^3/AF of water treated. If the full-scale plant treats a continuous flow of 3,500 gpm, the entire volume of Bayoxide media (2,625 ft^3) will be replaced every 90 days.

The above estimation of media usage rates suggests that the Bayoxide media could be replaced at twice the rate of the GFH media.

4.3.4 Backwash Water Quality & Quantity

The quality and quantity of the waste backwash water from the iron media and the sand/anthracite filter were closely monitored during the study. The current plan is to discharge the waste backwash water into the sanitary sewer. One of the questions to be answered was whether to discharge the entire waste backwash water into the sewer or to clarify the water onsite and recover some of it before the settled sludge is discharged to the sewer. The following are some of the important findings:

1. The waste backwash water from the GFH media contained high levels of iron (244 mg/L), sulfur (2,235 mg/L) TSS (1,050 mg/L), and COD (756 mg/L). By contrast, the waste backwash water from the Bayoxide media contained substantially lower levels of iron (6.8 mg/L), sulfur (78 mg/L), TSS (15 mg/L), and COD (14 mg/L).

2. The waste backwash water from the GFH media also included higher levels of aluminum, barium, chromium, copper, and zinc compared to the waste backwash water from the Bayoxide media. However, the levels may be low enough that they may not have a noticeable impact on the wastewater treatment plant discharge quality.

3. After allowing the waste backwash water to settle for one hour, the decant water was analyzed for TSS, iron, and manganese to determine if it could be returned to the head of the treatment system. The clarified backwash water from the GFH filter contained 20 mg/L TSS compared to only 8 mg/L in the clarified backwash water from the Bayoxide filter. Similarly, the iron concentration in the clarified GFH backwash water was 8.0 mg/L compared to only 1.2 mg/L in the clarified Bayoxide backwash water. The impact of recycling this decant water on the performance of the process was not tested.

4. Clearly, the quality of the clarified or unclarified backwash water from the Bayoxide media will be easier to manage than that from the GFH media.

5. An analysis was conducted to determine the quantity of backwash water generated from the overall full-scale treatment system of iron-media filtration followed by sand/anthracite filtration. Based on the pilot testing runtimes and backwash water requirements, the waste backwash water volume from a Bayoxide-Sand/anthracite treatment system is expected to represent 1.7% of the water treated through the plant. With a GFH-Sand/anthracite treatment system, the wastage rate increases to 3.3%. For a 3,500 gpm treatment plant, if the Bayoxide media is used upstream of sand/anthracite filtration, the daily backwash water generation rate is estimated at 84,000 gallons/day. If the GFH media is used upstream of the sand/anthracite filters, the daily backwash water generation rate is estimated at 168,000 gallons/day.

La Cumbre Mutual Water Company Conveyance Agreement

CITY AGREEMENT No. 16,838
Ordinance No. 4800

WATER CONVEYANCE AGREEMENT (State Water Project Water)
CITY OF SANTA BARBARA - LA CUMBRE MUTUAL WATER CO.

THIS AGREEMENT, dated and entered into as of February 11, 1993, by and between CITY OF SANTA BARBARA, a municipal corporation hereinafter referred to as "City",

and LA CUMBRE MUTUAL WATER COMPANY, a California corporation, herein referred to as "La Cumbre Mutual", Witnesseth:

WHEREAS, City is a charter city which owns, operates and maintains water distribution facilities and provides water service pursuant to its charter and the constitution and laws of the State of California; and,

WHEREAS, La Cumbre Mutual is a mutual water company organized under California law which owns, operates and maintains water distribution facilities and provides water service to its shareholders within its service area; and,

WHEREAS, State Water Project Water will be delivered to the City distribution system; and,

WHEREAS, La Cumbre Mutual has contracted with the Central Coast Water Authority (CCWA) to receive 1,000 acre feet per year (AFY) of State Water Project Water; and,

WHEREAS, City currently (and for the foreseeable future) has sufficient treatment and pipeline capacity to treat and deliver 1,000 Acre Feet a Year of State Water Project Water to La Cumbre Mutual on the easterly high pressure side of the pressure zone change station at 4317 Modoc Road or at other points on City's distribution system,

NOW, THEREFORE, the parties agree that the City of Santa Barbara will make services, facilities and capital improvements available as required to treat and transport such State Water Project Water, upon the following terms, provisions, limitations and conditions:

1. Conveyance Facilities The City shall make available to La Cumbre Mutual such existing City services, facilities and capital improvements, including rights of way and interests in joint powers facilities, which the Public Works Director determines are necessary to convey La Cumbre Mutual's portion of State Water Project Water to La Cumbre Mutual and which are incidental to, compatible with and accessory to the City use of water facilities. City may reject provision of any services, facilities, connections, rights or other contribution to the distribution facilities for such water, that the City Public Works Director determines, in the sole discretion of such Public Works Director, may be detrimental to, or adversely affect, City water facilities, operations or residents. As used herein, the term "State Water Project Water" includes any

water La Cumbre Mutual receives pursuant to an exchange under the Santa Ynez River/State Water Project Exchange Agreement, or other exchange agreement approved by the parties herein, to effect local distribution of such State Water Project Water.

2. Hold City Harmless In the event that City is required to add capital facilities or incur other unusual expense in order to continue delivery of such water, La Cumbre Mutual, in order to continue the provisions of this agreement shall make provision with the City to assume, pay and hold City harmless from any and all costs for such added facilities and expenses. Such costs shall include, but not by way of limitation, all necessary costs for design, permits, planning, mitigations, administration and construction, including any and all claims arising from such work.

PROBABLY 4017

3. Conveyance to Modoc Meter City will treat and provide conveyance capacity for up to 1,000 acre feet per Water Year of State Water Project Water to La Cumbre Mutual on the easterly, high pressure side of the pressure zone change station at 4317 Modoc Road, or at certain points on the City distribution system as may be mutually agreed upon subject to the terms and conditions set forth herein. The Water Year used throughout this agreement shall coincide with the year used by the California State Department of Water Resources for said State Water Project. La Cumbre Mutual shall be responsible for any and all costs, charges, fees and other requirements associated with the State Water Project as required for La Cumbre Mutual to obtain such State Water Project Water.

4. Limit on Conveyance The conveyance of State Water Project Water through City facilities to La Cumbre Mutual shall not exceed 1000 gallons per minute, except as may, from time to time, be approved by the City Public Works Director. La Cumbre Mutual shall maintain records of all deliveries pursuant to this agreement and shall adjust valves on a monthly basis according to a plan for such delivery of water to avoid exceeding the delivery rate and to avoid exceeding any delivery in excess of the amount provided under the terms, conditions, provisions and limitations of this agreement. Any conveyance of water in excess of the total amount provided herein shall be immediately accounted for to City and shall be fully reconciled by exchange, or other, alternate means approved by the City Public Works Director, within the next succeeding Water Year. In no event shall La Cumbre Mutual permit conveyance of any water which exceeds the correct amount under this agreement by more than 5% during any Water Year.

5. State Water Project Water Schedule La Cumbre Mutual shall give City notice of its State Water Project Water delivery schedule at the same time as it is given to the CCWA in accordance with Section 4 of the Water Supply Agreement between La Cumbre Mutual and the CCWA.

6. Treatment and Conveyance Costs Commencing on the date State Water Project water is first available through the Coastal Aqueduct into the Cachuma reservoir, City agrees to calculate and invoice to La Cumbre Mutual and La Cumbre Mutual agrees to pay City, within

sixty (60) days of receipt of such invoice, for costs for the treatment and conveyance capacity for such State Water Project Water as follows:

a. **The Cost of Treatment of the Water.** La Cumbre Mutual agrees to pay for the costs of treatment of all State Water Project Water delivered (including treatment of that water calculated to have been lost by reason of leaks, accidents, casualty or other losses), in accordance with the formula by which the City is obligated to pay for such treatment pursuant to the Joint Exercise of Powers Agreement providing for water treatment between the City, Carpinteria County Water District, Montecito County Water District, Summerland County Water District, and any additions, amendments, or modifications now or hereafter made to such agreement or arrangement.

b. **The Cost of Conveyance Capacity of the Water.** La Cumbre Mutual agrees to pay as consideration for the conveyance capacity herein, a total sum each water year equal to:

i. 0.62% of the budget amount approved by the City for that year for the Operating and Capital Budgets for the Distribution Section of the Public Works Department, Water Resources Division, less the costs associated with Gibraltar Dam and Mission Tunnel; together with,

ii. 1.22% of the budget amount approved by the City for that year for insurance and overhead charges attributed to the Water Distribution System in the Public Works Water Administration Budget,

which percentages are agreed to be the portion of such system operation, maintenance and capital costs attributable to the uses provided to La Cumbre Mutual under this agreement, based upon the assumptions described in the attached hereto and marked Exhibit A. The parties agree that such assumptions are reasonable assumptions for the present conditions. The parties further agree that in the event that significant material changes occur to the relative total length of City pipeline maintained, significant material changes occur in relative age; health or safety requirements; unforseen significant special costs are incurred; or other significant change in the relationship between the conduit used for purposes of this agreement and the City's overall water distribution system, such percentages will be adjusted to reflect such change, upon demand by either party, no more often than one time in five years. In the event that budgets or organizations are restructured, La Cumbre Mutual will pay that portion of the budgeted amount to cover the same or equivalent costs, with the same assumptions about percentage participation of the activity.

7. Limited City Liability City shall not be liable to La Cumbre Mutual for any indirect damage arising from shortages in the amount of water to be made available for delivery pursuant to this agreement. City shall not be liable to La Cumbre Mutual for any damages, direct or

indirect, arising from shortages in the amount of water to be made available for delivery to La Cumbre Mutual by the CCWA, caused by non-availability of water for any reason beyond its control.

8. Interruption of Conveyance City may temporarily discontinue or reduce the delivery of State Water Project Water to La Cumbre Mutual for the purpose of necessary investigation, inspection, maintenance, repair or replacement of any of City's water system facilities. City shall notify La Cumbre Mutual as far in advance as possible of any such discontinuance or reduction, except in cases of emergency, in which case notice need not be given. City will not be liable for any damages, direct or indirect caused by any discontinuance or reduction of delivery of State Water Project Water to La Cumbre Mutual. City will make reasonable efforts to deliver the State Water Project Water which otherwise would have been delivered during the period of discontinuance or reduction at a delivery schedule mutually agreeable to the parties.

9. Connection Facilities La Cumbre Mutual shall pay for all costs associated with the required water main connection, a new vault, meter and a new direct water line from La Cumbre Mutual facilities to the easterly, high pressure side of the pressure zone change station at 4317 Modoc Road, according to plans and specifications acceptable to the City Public Works Director, or at such other points and locations as may be approved by the City. Such facilities shall be capable of transmission of the expected 1000 gallons per minute flows. City shall select the appropriate meter for the facilities. La Cumbre Mutual shall protect against casualty loss, service and maintain all La Cumbre Mutual facilities on its side of the meter to be installed. City shall, as part of the water conveyance costs, protect against casualty loss, service and maintain water facilities to and including the meter installed. The City specifically reserves all rights, rights of way, easements and uses of public property other than those required for the uses provided herein pursuant to the approvals required by this Agreement.

10. System Water Losses La Cumbre Mutual shall share with City any loss of water due to leaks, main breaks, errors in measurement and other losses attributable to the operation of the City treatment and/or conveyance facilities. Unless otherwise mutually agreed by La Cumbre Mutual and the City Public Works Director, such loss shall be assumed to be 8% of the water conveyed pursuant to this agreement.

11. Limited Liability for Water City shall not be liable for the control, carriage, handling, use, disposal, or distribution of water delivered to La Cumbre Mutual after such water has passed the delivery facilities of City, nor for claim of damage of any nature whatsoever, including but not limited to property damage, personal injury or death, arising out of or connected with the control, carriage, handling, use, disposal or distribution of such water beyond said delivery facilities and including attorneys fees and other costs of defense in connection therewith. La Cumbre Mutual shall investigate, indemnify, defend, and hold harmless City from any such damages or claims of damages. Except and to the extent provided in paragraph 10, herein, La Cumbre Mutual shall not be liable for the control, carriage, handling, use, disposal, or distribution of water before conveyance to La Cumbre Mutual facilities, nor for claim of damage of any nature whatsoever, including but not limited to property damage, personal injury

or death, arising out of or connected with the control, carriage, handling, use, disposal or distribution of such water outside the La Cumbre Mutual system and including attorneys fees and other costs of defense in connection therewith. City shall investigate, indemnify, defend, and hold harmless La Cumbre Mutual from any such damages or claims of damages.

12. No Other Conveyance Covered City shall have no obligation to deliver water to any other person or entity nor to any other location than as specified herein or as otherwise mutually agreed.

13. Term The term of this Agreement shall commence January 1, 1993 and thereafter coincide with the term of the Water Supply Agreement between La Cumbre Mutual and the CCWA.

14. Legal Limitations City shall have no liability to La Cumbre Mutual for failure to perform under the terms of this Agreement caused as a result of any and all legal impediments to performance including but not limited to the inability of City to secure the right to use distribution facilities owned or controlled by other entities and including but not limited to any order, judgment, injunction or other action by a State or Federal court or administrative agency.

15. Reservation of Discretion As to all permits or environmental review which the City may be asked or required to issue or undertake in connection with this Agreement or any construction required, and as to any City regulations which the City must administer or apply in connection with the same, the City specifically reserves the discretion necessary to make any and all reviews, require any and all conditions or limitations, and issue any such disapprovals as may reasonably be called for in the responsible exercise of City review, permit, environmental, planning or other governmental or owner's authority in connection with any such improvement or decision, and the officers, agents and employees of the City shall be free to vote, express and/or apply their conscience in such matters under their authority. In the event that such determination, condition, review, limitation or disapproval materially increases the consideration required under this Agreement or affects the performance or costs hereunder La Cumbre Mutual shall, nevertheless, perform as necessary under such approvals to accomplish the purposes of this Agreement.

16. Cooperation in Foothill Basin The parties agree to cooperate in the management, injection, extraction and recharge of The Foothill Groundwater Basin in order to maximize the use of the aquifer and the water resources stored in the aquifer. The parties agree to exercise such legal rights as each may have, by contractual agreement with each other, to obtain the maximum beneficial use of such water and of such storage capacity as the parties may obtain together.

17. Reservation of Certain Rights, Claims & the Foothill Tolling Agreement The parties reserve from the effect of this agreement certain rights, claims and all effect of the Foothill Tolling Agreement, as follows:

a. **Conveyance facilities:** The parties acknowledge and agree that this agreement is not intended to affect the rights and claims of either party with respect to La Cumbre Mutual's claim that La Cumbre Mutual has purchased six (6) cubic feet per second of capacity in the portion of the water distribution system transferred to the City by Goleta Water District and used to deliver the State Water Project Water to La Cumbre Mutual pursuant to this Agreement. The parties agree, instead, that they each reserve all legal claims defenses, and rights they have with respect to such claim.

b. **Foothill basin:** The parties do not intend by this agreement to alter or modify existing legal rights in or to the Foothill Basin, do not waive legal positions regarding the past use of the basin or the position of either with regard to the existing potential and existing capacity of the basin. The parties acknowledge the AGREEMENT RESERVING RIGHTS AND TOLLING THE STATUTE OF LIMITATIONS, dated September 1, 1990 between the City of Santa Barbara and the Foothill Basin Landowners, which both have signed, and intend, by this agreement, no modification, amendment or alteration of the force and effect of such tolling agreement.

18. Use of Foothill Basin In order to make such maximum use of the aquifer and storage, the parties agree:

a. To cooperate to develop engineering, geotechnical and hydrological information about the Foothill Basin;

b. To cooperate to recharge water into the basin and to provide such injection of water as the respective parties determine to be in their own best interests;

c. To keep detailed records concerning the water extracted from or injected into the Foothill Basin, and, to the extent feasible, to cause detailed records to be kept of any water extracted by others, and such other geological and practical considerations as may effect the use of the Foothill Basin.

19. Foothill Basin Groundwater Agreement The parties shall develop a detailed Foothill Basin Groundwater management program and operating agreement for the Foothill Basin which shall include:

a. A schedule for water extractions allowed under each foreseeable water use circumstance, preserving for the City a drought reserve reasonably sufficient to provide a substantial supplement to other available groundwater supplies to meet City needs in times of shortage of other water resources, while providing to La Cumbre Mutual a regular and useable source of economical water, comparable in volume to its historic uses, and a reasonable proportion of the drought reserve.

b. Reasonable participation in the costs of studies and enhancements of the groundwater, and injection of water for storage, all subject to the discretion of each party to refrain from financial contribution to any study or enhancement which such party determines in advance to be of insufficient benefit to warrant commitment of funds.

c. Full credit for water injected by a party.

d. A process for coordinating extractions.

e. A process for resolving disputes.

Such Foothill Basin Groundwater management program shall be adopted before first conveyance of State Water Project Water begins to La Cumbre Mutual pursuant to this agreement.

20. Interim Measures for Basin Until completion of such Foothill Basin Groundwater management program, it is agreed that the City may continue to restore water to the basin by injection, for use as a drought reserve, and La Cumbre Mutual may continue to extract water (from the basin) at a rate that will not exceed 300 acre feet (on a five year, running average) of water per Water Year from the Foothill Basin, without consent of the City Public Works Director.

21. Records for Basin La Cumbre Mutual shall keep accurate records of all water removed from the Foothill Basin. La Cumbre Mutual shall make permanent record of any and all such extractions on a monthly basis and update and maintain a five year running average of such water from the Foothill Basin, no less often than every three months (quarterly). Each update for the running average shall delete the earliest period and add the latest period. Where consent is obtained to exceed such limit, treatment of the deviation in further calculations shall be according to any conditions for such calculation of the City Public Works Director at the time of the consent. Account shall be kept initially upon records presently in possession of La Cumbre Mutual and after the date of this agreement from records kept monthly of all water removed from the basin.

22. Pumping From Basin La Cumbre Mutual shall maintain a plan for pumping from the Foothill Basin. La Cumbre Mutual shall reconcile for the City its plan for pumping with the records of performance and identify to the City adjustments made to maintain compliance with this Agreement, no less often than annually. La Cumbre Mutual shall make adjustments to its pumping and other removal from the basin, monthly, as required to avoid exceeding such 300 acre foot (five year running average) limitation. City shall receive copies of all such records and calculations. Copies of all such records and calculations shall be maintained by La Cumbre Mutual within the County of Santa Barbara at a reasonable business location to which City shall have access during reasonable business hours upon reasonable notice. City shall have reasonable access to all water production facilities within the foothill basin, during reasonable business hours for the purpose of inspection, reading meters, and conducting reasonable tests and studies of production.

23. Good Faith. Wherever in this Agreement a party has the right to approve an act of another party, the former shall exercise such discretion in good faith and according to normal commercial standards. Similarly, where a party is required to satisfy a condition or complete an act in a certain fashion or within a specified time period, that party shall pursue such objectives in good faith and make all reasonable efforts to accomplish the same; the other party shall likewise in good faith cooperate and assist the other party in accomplishing this task to cause the consummation of the agreement as intended herein.

24. Construction. The provisions of this Agreement should be liberally construed to effect its purposes. the language of all parts of this Agreement shall be construed simply according to its plain meaning and shall not be construed for or against either party, as each party has participated in the drafting of this document and has had the opportunity to have their counsel review it. Whenever the context and construction so requires, all words used in the singular shall be deemed to be used in the plural, all masculine shall include the feminine and neuter, and vice versa.

25. Captions, Headings and Exhibits. The captions, headings and index of this Agreement are for convenience only and have no force and effect in the interpretation or construction of this Agreement. All exhibits attached hereto are by this reference incorporated herein as though fully set forth in this Agreement.

26. Severability. If any term, provision, covenant or condition of this Agreement shall be or become illegal, null, void or against public policy, or shall be held by any court of competent jurisdiction to be illegal, null or void or against public policy, the remaining provisions of this Agreement shall remain in full force and effect and shall not be affected, impaired or invalidated thereby. The term, provision, covenant or condition that is so invalidated, voided or held to be unenforceable shall be modified or changed by the parties to that extent possible to carry out the intentions and directives set forth in this Agreement.

27. Counterparts. This Agreement may be executed in any number of counterparts, each of which shall be an original, but all of which shall constitute one and the same instrument.

28. Assignment. Neither party shall have the right to assign its rights or delegate any of its obligations or duties hereunder without the express written consent of the other party.

29. Successors and Assigns. Except as restricted herein, this Agreement shall be binding on and shall inure to the benefit of the parties and their respective heirs, legal representatives, successors and assigns.

30. Waiver. The waiver of any breach of any provision hereunder by any party to this Agreement shall not be deemed to be a waiver of any preceding or subsequent breach hereunder, nor shall any waiver constitute a continuing waiver. No waiver shall be binding unless executed in writing by the party making the waiver.

31. Governing Law. The validity and interpretation of this Agreement shall be governed by the laws of the State of California, with venue for all purposes to be proper only in the County of Santa Barbara, State of California.

32. Notices. All notices, approvals, acceptances, demands and other communications required or permitted hereunder, to be effective shall be in writing and shall be delivered either in person or by mailing the same by United States mail (postage prepaid, registered or certified,

return receipt requested) or by Federal Express or other similar overnight delivery service to the party to whom the notice is directed at the address of such party as follows:

To: La Cumbre Mutual
La Cumbre Mutual Water Company
695 Via Tranquila
Santa Barbara, California 93110

With Copy to:
Griffith & Thornburgh
ATTN: L. Donald Boden
8 E. Figueroa St., Suite 300
Santa Barbara, California 93101

To: The City of Santa Barbara
Santa Barbara Public Works Director
P.O. Box 1990
Santa Barbara, California 93102-1990

Any written communication given by mail shall be deemed delivered two (2) business days after such mailing date and any written communication given by overnight delivery service shall be deemed delivered one (1) business day after the dispatch date. Either party may change its address by giving the other party written notice of its new address as herein provided.

33. Nondiscrimination. Parties shall observe restrictions against discrimination as provided for contractors under the provisions of Santa Barbara Municipal Code § 9.126.020, a copy of which is attached hereto as Exhibit B.

34. Authorization. All officers and individuals executing this and other documents on behalf of the respective parties do hereby certify and warrant that, upon adoption of this agreement by ordinance by the Santa Barbara City Council, they have the capacity and have been duly authorized to so execute the documents on behalf of the entity so indicated. Each signatory shall also indemnify the other parties to this Agreement, and hold them harmless, from any and all damages, costs, attorneys' fees, and other expenses, if the signatory is not so authorized.

35. No Third Party Rights. Nothing in this Agreement, whether express or implied, is intended to confer any rights or remedies under or by reason of this Agreement on any persons other than the parties hereto and their respective successors and assigns, nor is anything in this agreement intended to relieve or discharge the obligations or liability of any third persons to any party to this Agreement, nor shall any provision give any third persons any right or subrogation or action over or against any party to this Agreement.

36. Entire Agreement, Effective Date and Amendment. In conjunction with the matters considered herein, this Agreement contains the entire understanding and agreement of

the parties and there have been no promises, representations, agreements, warranties or undertakings by any of the parties, either oral or written, of any character or nature hereafter binding except as set forth herein. This agreement shall not become effective unless and until all parties to the Joint Exercise of Powers Agreement providing for water treatment between the City, Carpinteria County Water District, Montecito County Water District, Summerland County Water District have approved treatment of water for La Cumbre Mutual, as provided herein. This Agreement may be altered, amended or modified only by an instrument in writing, executed by the parties to this Agreement and by no other means. Each party waives their future right to claim, contest or assert that this Agreement was modified, canceled, superseded or changed by any oral agreement, course of conduct, waiver or estoppel.

IN WITNESS WHEREOF, City and the La Cumbre Mutual Water Company have executed this agreement as of the date and year first written above.

CITY OF SANTA BARBARA,
A Municipal Corporation

By _____
Mayor

ATTEST:

By _____
City Clerk Deputy

APPROVED AS TO CONTENT:

_____
Public Works Director

APPROVED AS TO FORM:

BY _____
City Attorney

La Cumbre Mutual Water Company

By _____
George Goodall, President

ATTEST:

_____
Frank Stoltze, Secretary

APPROVED AS TO FORM:

_____
L. Donald Boden, Attorney

EXHIBIT A. CONVEYANCE CHARGES FOR LA CUMBRE MUTUAL STATE WATER

This appendix describes the assumptions used to calculate the annual conveyance charge for wheeling La Cumbre Mutual Water Company's (La Cumbre) State Water delivery through the City of Santa Barbara water distribution system to the La Cumbre transfer meter identified in Section 9 for further distribution within the La Cumbre water distribution system. It also provides an example calculation based on budget items from the City's Fiscal Year (FY) 1993 Budget.

The conveyance charge does not include the cost of Cater Treatment Plant operations, maintenance and capital costs. Treatment costs will be billed quarterly, developed on the same basis as for existing joint powers users.

The conveyance charge is based on the following:

Operations and Capital Charge:

- La Cumbre delivery system; a total pipeline distance of 19,045 feet ranging in size from 36 inches to 12 inches. Total pipe footage in the City is 1,565,646 feet. This results in a percentage of pipe multiplier of 1.22%.

- A 2.8 size factor multiplier; the average size of a City water main is 8.29 inches. The average size of the La Cumbre delivery system is 23.33 inches. The size factor is for adjusting the charge to compensate for added maintenance and replacement costs associated with the above average size of the delivery piping.

- A 0.6 age factor multiplier; the average age of a City water main is 40 years. The average age of the La Cumbre delivery system is 24 years. The age factor is for adjusting the charge to compensate for an equitable share of maintenance and replacement costs associated with the younger age of the delivery piping.

- A 30% demand factor multiplier; the 1980 Boyle Report identified an average annual potential demand of 1,417 gallons per minute in the La Vista zone. This figure includes existing La Cumbre and Goleta Overlap demand, of which some of the La Cumbre demand will be replaced by La Cumbre State Water. The City will be responsible for delivering a maximum of 920 AF per year to La Cumbre (1,000 AF minus 8% or 80 AF in delivery losses). 920 acre feet per year equals 571 gallons per minute if taken on a continuous basis. 571/(1417+571) = 28.7% rounded to 30%.

- The combination of the above terms results in a multiplier of 0.62% (0.0122 x 2.8 x 0.6 x 0.30). This percentage is fixed except as provided for in Section 6.b.

- This is multiplied by the current approved Operating and Capital Budgets for the Distribution Section of the Public Works Department Water Resources Division minus costs associated with Gibraltar Dam and Mission Tunnel (Operating Budget of $2,975,896; Capital Budget of $1,840,000 in FY 1993). In future years, budget items clearly not associated with the city-wide distribution system will be subtracted out.

Overhead Charge

- Added to the Operations and Capital Charge is an overhead charge based upon the current approved insurance and overhead charges in the Public Works Water Administration Budget ($1,143,355 in FY 1993).

- This is multiplied by the Distribution Section's percentage of the total Water Fund Operating Budget minus costs associated with desalination ($2,975,896/$11,438,720 in FY 1993) and further multiplied by the percentage of piping used in the delivery of State Water through the City system (19,045 feet/1,565,646 feet or 1.22%). The latter percentage (1.22%) is fixed except as provided for in Section 6.b.; the Distribution Section's percentage of the total Water Fund will be adjusted on a yearly basis.

As an example, the calculation for the conveyance charge based on the City's FY 1993 budget would be as follows:
Operations and Capital Charge:

($2,975,896 + $1,840,000) x 0.0062 = $29,858.56

Overhead Charge:

$1,143,355 x ($2,975,896/$11,438,720) x 0.0122 = $3,628.95

The total wheeling charge is $29,858.56 + $3,628.95 = $33,487.51

The wheeling charge would be adjusted in July of each fiscal year to reflect current operating and capital expenses. The total amount of the wheeling charge is due to the City regardless of the amount of State Water actually delivered to La Cumbre. In the example shown, La Cumbre would owe the City $33,487.51 even if it took delivery of no State Water that year.

EXHIBIT B

CONTRACTOR'S NONDISCRIMINATORY EMPLOYMENT CERTIFICATE

Santa Barbara Municipal Code § 9.126.020

A. Certificate Generally

Consistent with a policy of nondiscrimination in employment on contracts of the City of Santa Barbara and in furtherance of the provisions of Section 1735 and 1777.6 of the California Labor Code a "contractor's obligation for nondiscriminatory employment certificate" as hereinafter set forth shall be attached and incorporated by reference as an indispensable and integral term of all bid specifications and contracts of the City for purchases, services, and the construction, repair, or improvement of public works.

B. Contents of Certificate

In performing the work of this contract, the Contractor agrees as follows:

1. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, national origin, ancestry, sexual orientation, political affiliation or beliefs, sex, age, physical handicap, medical condition, marital status or pregnancy (as those terms are defined by the California Fair Employment and Housing Act -- Government Code Section 12900-12996), except where such discrimination is based on a bona fide occupational qualification. The Contractor will take positive action or ensure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, national origin, ancestry, sexual orientation, political affiliation or beliefs, sex, age, physical handicap, medical condition, marital status or pregnancy (as those terms are defined by the California Fair Employment and Housing Act -- Government Code Section 12900-12996), except where such discrimination is based on a bona fide occupational qualification. Such action shall include but not be limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the City setting forth the provisions of this nondiscrimination clause.

2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, national origin, ancestry, sexual orientation, political affiliation or beliefs, sex, age, physical handicap, medical condition, marital status or pregnancy (as those terms are defined by the California Fair Employment and Housing Act -- Government Code Section 12900-12996), except where such discrimination is based on a bona fide occupational qualification.

3. The Contractor will send to each labor union or representative of workers, with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided by the City advising the said labor union or workers' representative of the Contractor's commitments under this provision, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

4. The Contractor will permit access to his records of employment, employment advertisements, application forms, and other pertinent data and records by the City, the Fair Employment Practices Commission, or any other appropriate agency of the State designated by the City for the purposes of investigation to ascertain compliance with the Contractor's Obligation for Nondiscriminatory Employment provisions of this contract, or Fair Employment Practices statute.

5. A finding of willful violation of the nondiscriminatory employment practices article of this contract or of the Fair Employment Practices Act shall be regarded by the City as a basis for determining that as to future contracts for which the Contractor may submit bids, the Contractor is a "disqualified bidder" for being "nonresponsible".

The City shall deem a finding of willful violation of the Fair Employment Practices Act to have occurred upon receipt of written notice from the Fair Employment Practices Commission that it has investigated and determined that the Contractor has violated the Fair Employment Practices Act and has issued an order under Labor Code Section 1426 or obtained an injunction under Labor Code Section 1429.

Upon receipt of any such written notice, the City shall notify the Contractor that unless he demonstrates to the satisfaction of the City within a stated period that the violation has been corrected, he shall be declared a "disqualified bidder" until such time as

the Contractor can demonstrate that he has implemented remedial measures, satisfactory to the City, to eliminate the discriminatory employment practices which constituted the violation found by the Fair Employment Practices Commission.

6. Upon receipt from any person of a complaint of alleged discrimination under any City contract, the City Administrator shall ascertain whether probable cause for such complaint exists. If probable cause for the complaint is found, the Administrator shall request the City Council to hold a public hearing to determine the existence of a discriminatory practice in violation of this contract.

In addition to any other remedy or action provided by law or the terms of this contract, the Contractor agrees that, should the City Council determine after a public hearing duly noticed to the Contractor that the Contractor has not complied with the nondiscriminatory employment practices provisions of this contract or has willfully violated such provisions, the City may, without liability of any kind, terminate, cancel, or suspend this contract, in whole or in part. In addition, upon such determination the Contractor shall, as a penalty to the City, forfeit a penalty of $25.00 for each calendar day, or portion thereof, for each person who was denied employment as a result of such noncompliance. Such moneys shall be recovered from the Contractor. The City may deduct any such penalties from any moneys due the Contractor from the City.

7. The Contractor certifies to the City that he has met or will meet the following standards for positive compliance, which shall be evaluated in each case by the City:

a. The Contractor shall notify all supervisors, foremen and other personnel officers in writing of the content of the nondiscrimination provision and their responsibilities under it.

b. The Contractor shall notify all sources of employee referrals (including unions, employment agencies, advertisements, Department of Employment) of the content of the nondiscrimination provision.

c. The Contractor shall file a basic compliance report as required by the City. Willfully false statements made in such reports shall be punishable as provided by law. The compliance report shall also specify the sources of the work force and who has the responsibility for determining whom to hire, or whether or not to hire.

d. The Contractor shall notify the City of opposition to the nondiscrimination provision by individuals, firms or organizations during the period of this contract.

8. Nothing contained in this Contractor's Obligation for Nondiscriminatory Employment Certificate shall be construed in any manner to prevent the City from pursuing any other remedies that may be available at law.

9. The Contractor certifies to the City that he will comply with the following requirements with regard to all subcontractors and suppliers:

a. In the performance of the work under this contract, the Contractor will include the provisions of the foregoing paragraphs (1) through (8) in all subcontracts and in any supply contract to be performed within the State of California, so that such provisions will be equally binding upon each subcontractor and each supplier.

b. The Contractor will take such action with respect to any subcontract or purchase order as the City may direct as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that in the event the Contractor becomes involved in, or is threatened with, litigations with a subcontractor or supplier as a result of such direction by the City, the Contractor may request the City to enter into such litigation to protect the interests of the City.