WASTEWATER FLOW PROJECTIONS

SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT

Prepared for

City of Santa Rosa
and
U.S. Army Corps of Engineers

July 1996

Prepared by

WEST YOST & ASSOCIATES
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For

HARLAND BARTHOLOMEW & ASSOCIATES, INC.

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1 INTRODUCTION

As an element of the EIR/EIS for the Santa Rosa Subregional Long-Term Wastewater Project, West Yost & Associates was retained to analyze the current water conservation programs of Member Entities, their impact on the average dry weather wastewater flow (ADWF), and the potential for implementation of several water conservation alternatives which could further reduce flow. This technical memorandum presents the data and assumptions, and the resultant projection of ADWF for each Member Entity with no water conservation, and with their current programs in place. The projection is based on buildout of each Member Entities' General Plan, and upon demographic data contained in the Member Entity General Plans. This memo also describes the current state requirements for efficient water using fixtures and their impact on projected wastewater flows. A second technical memorandum will be prepared in which alternatives that could be implemented to further reduce flow will be developed and evaluated.

The Santa Rosa Subregional Wastewater System (Subregional System) provides collection, treatment and disposal of wastewater for the five Member Entities which include:

- Santa Rosa
- Rohnert Park
- Sebastopol
- Cotati
- South Park County Sanitation District (SPCSD)

The first element in the planning and design of Subregional System wastewater treatment and disposal facilities is to project future wastewater flows. Typically future flows are projected based upon historical flow factors (such as flow per dwelling unit [DU], flow per employee, or flow per capita) and projected numbers of DUs, employees, and population. The flow factors are normally estimated using current or historical wastewater flows, and current or historical land use data (e.g., number of DUs and employees) which matches the years when flow data are available.

However, in recent years, the State of California has instituted water conservation laws, and the Member Entities have implemented programs which reduce water use and wastewater flow generation. These laws and programs result in a decrease in the flow factors and projected wastewater flows (termed in this memo the "with conservation" flows) below the expected flow if these laws and programs did not exist (termed in this memo the "non-conservation" flows). The non-conservation flow, therefore, would be the flow if there were no low flow toilets (1.6 or 3.5 gpf), no low flow showerheads, and none of the Member Entities had metered water connections with commodity rates or were performing water audits. Presented in Table 4.3-1 are the projected land uses, flow generation factors with water conservation, and the resulting ADWF for the Subregional Wastewater System Member Entities. As shown in Table 4.3-1, the 1994 ADWF was about 17.11 mgd. Of the 17.11 mgd, 16.84 mgd was treated at Laguna Wastewater Treatment Plant (WWTP), and 0.32 mgd was treated at Oakmont WWTP. The flow treated at Oakmont WWTP is primarily residential flow. It was included in the 1994 ADWF

because during the summer, solids generated by the plant are conveyed to Laguna WWTP, and in the winter, the Oakmont WWTP is not operated so all flow goes to the Laguna WWTP. The projected ADWF at buildout of the Member Entity general plans will be about 21.34 (including about 0.3 to 0.4 mgd that would be treated at the Oakmont WWTP and 0.321 mgd capacity that Santa Rosa has committed to treating septage from Sonoma County). As shown in Table 4.3-2, if the Member Entities had not implemented any water conservation programs, the 1994 flow would have been about 19.05 mgd, and the projected flow at buildout would have been about 26.12 mgd.

It should be stressed that even with water conservation, sewer infiltration and inflow must be aggressively controlled, or wastewater flow to the treatment plant can exceed plant capacity.

Presented in this technical memorandum are the projected future land uses and the data supporting the flow factors, and the resultant projections of ADWF for the Subregional System. The land use projections were extracted from the Member Entities' General Plans. Because detailed historical ADWF data were unavailable (e.g., flow of wastewater generated from each land use type), it was necessary to estimate the portion of ADWF for each user type based upon historical indoor water uses (for which metered water use data were available for most land use types). Future flow factors were estimated based upon the historical flow factors and estimates of the decrease in water use and associated wastewater flow generation due to the State's water conservation laws and Member Entity water conservation programs.

The following is a list of acronyms and abbreviations used in this report:

ABAG 94	Association of Bay Area Governments, 1994 Projections
ADWF	Average Dry Weather Wastewater Flow
BMP	Best Management Practice
BPU	Board of Public Utilities
CDOF	California Department of Finance
CII	Commercial, Industrial, and Institutional
DU	Dwelling Unit
EPS	Economics and Planning Systems
gpcd	gallons per capita per day
gpf	gallons per flush
LFSH	Low Flow Shower Head
MOU	Memorandum of Understanding
SCWA	Sonoma County Water Agency
SPCSD	South Park County Sanitation District
SSU	Sonoma State University
Stu	Students
UAW	Unaccounted for Water
ULFT	Ultra Low Flow Toilet
WWTP	Wastewater Treatment Plant

2 THE SUBREGIONAL SYSTEM

The Member Entities of the Subregional System are located in the California Coastal Mountains, within the Russian River watershed (near the junction of Highway 101 and Highway 12). The Subregional System includes the local collection system, regional interceptor sewers, Laguna WWTP, and disposal/discharge facilities. The individual local collection systems are owned and operated by the Member Entities.

The Laguna Wastewater Treatment Plant (WWTP), located along Highway 116 between Sebastopol and Cotati, is owned and operated by the City of Santa Rosa, and managed by the Board of Public Utilities (BPU). The BPU, however, has only advisory authority to implement water conservation measures within the Subregional System. The plant has a current treatment capacity of 18 million gallons per day (18 mgd). The City of Santa Rosa contracts with the Member Entities (the Cities of Rohnert Park, Sebastopol, and Cotati, and the South Park County Sanitation District), to treat wastewater collected in the Subregional System. The City of Rohnert Park currently pumps to the Laguna WWTP wastewater discharged into its collection system by the City of Cotati and Sonoma State University (SSU).

The current treatment plant capacity allocated to each of the Member Entities is summarized in Table 4.3-3. The City of Cotati recently became a Member Entity and now contracts directly with the City of Santa Rosa for wastewater treatment, but remains dependent on Rohnert Park for collection and pumping of wastewater to the WWTP until the City of Cotati constructs its own sewer interceptor to provide a direct tie to the plant. Cotati is currently out to bid on it's own sewer interceptor which will convey a portion of its flow directly to the plant.

3 SUBREGIONAL AREA CHARACTERISTICS

Presented in Table 4.3-4 and discussed in this section are the relevant demographic characteristics of the Member Entities of the Subregional System.

The following sources were used for demographic data:

- The Santa Rosa 2010 General Plan, first published in July 1991 and republished with amendments in August, 1994.
- The Rohnert Park General Plan, Second Draft, dated June 30, 1994.
- The City of Cotati General Plan 1980-2005 (the 1990 Update).
- The City of Sebastopol Draft General Plan, March 1994.
- The Economic and Planning Systems' Memorandum (dated August 9, 1995, reproduced in Appendix A) and the August 21, 1995 update. Within this memorandum, demographic data taken directly from the Member Entities' General Plans are presented (the columns titled "Buildout"). Additionally, data from ABAG 94 are presented (columns titled with a year). For this wastewater flow projection, preference was always given to General Plan data over ABAG 94 data.
- Data from the California Department of Finance (CDOF) -Demographic Research Unit (data reproduced in Appendix A).
- Projections 94 from the Association of Bay Area Governments (ABAG 94).

These sources are not always consistent with one another. Preference was always given to the Member Entity General Plans over any other source. In general, the CDOF historical data agreed more closely with the General Plans than did the ABAG 94 data; consequently, preference was given to CDOF data over ABAG data.

The most predominant land use in the Subregional System service area is for residential housing, which includes single family homes, apartments, multiplex units, and mobile homes. Most of the remaining land uses have been grouped into the Commercial, Industrial and Institutional (CII) land use category, which includes commercial, industrial, schools, churches, and public buildings. These land use classifications were selected to match the water billing data available from the Member Entities. Agricultural land use has been excluded from this analysis because agricultural water is not collected and conveyed to the Laguna WWTP.

For residential areas, there are three characteristics that greatly influence water use, wastewater flow generation and wastewater flow reduction potential:

- Total Dwelling Units and Dwelling Unit density: The greater the total number of DUs, the greater the water use. However, a higher density of DUs (the number of DUs per acre) tends to result in less water use per DU because less water is required for outdoor irrigation.

- Household Size: Larger households (number of persons living within the household), use more water and generate more wastewater.

- Age of Housing Stock: Newer homes and apartments generally use less water than similar sized older homes because the new homes were constructed with low flow fixtures (e.g., low flow toilets and shower heads).

Housing stock defined for the Years 1980, 1990 and 1994 were derived from data prepared by the CDOF. This source was used because the Member Entity General Plans provide incomplete historical data, and the Santa Rosa General Plan references this source (page VII-49). The Buildout values are from the EPS memorandum and are based upon the Member Entity General Plans.

Historical employment data were obtained from the Member Entity General Plans and the EPS memorandum (from ABAG 94). Buildout employment data were obtained from the EPS memorandum, and are based upon the Member Entity General Plans.

4 WASTEWATER FLOW AND WATER USE

Most water used indoors eventually becomes wastewater and is collected and conveyed to the WWTP. Exceptions to this generality include water used for watering of plants, some water used for cooking, and some water used for cleaning. These uses are small compared to indoor water use which does enter the wastewater system, for example, showering, toilets, dish and clothes washing, and most cleaning and cooking water. If indoor water use is known for the various land use types, it can be used to apportion the total wastewater flow by land use type and to estimate the wastewater generation factor for that land use type.

Only limited data are available to define historical wastewater flows for the Member Entities. Available data include the combined flow from Santa Rosa and the SPCSD, the combined flow from Rohnert Park and Cotati, and the flow from Sebastopol. There are no data available to define wastewater flow from the land use types within the Member Entities. However, metered water use data are available for residential and CII land uses (or can be reasonably estimated) for each Member Entity. Consequently, metered water use data were used to estimate residential and CII wastewater flows by separating the measured wastewater flow for each Member Entity by the same proportions as have been measured for indoor water use of that Member Entity.

4.1 WATER USE

Santa Rosa (including SPCSD) and Sebastopol meter water sales to at least two broad customer classes which include residential and CII (nonresidential flows). Rohnert Park meters water sales to CII and most multi-family customers, but not single family residential units constructed prior to January 1992. For Rohnert Park, single family unit water sales were estimated as 90 percent (10 percent of production assumed lost from the system, as assumed in the Montgomery Watson Water Use Memorandum prepared for the Sonoma County Water Agency, draft dated March 30, 1994) of the water produced, minus the remaining measured uses (MFR, CII, and agricultural). Residential water use was then calculated as the sum of the measured multifamily water use and the estimated single family water use.

Presented in Table 4.3-5 are the residential (single family and multi family) water use data for Santa Rosa and SPCSD, Rohnert Park, and Sebastopol (averages are for at least 3 years between 1990 and 1994). No data are shown for Cotati because Cotati's billing system is unable to provide a breakdown of water use by user type for 1994.

Based upon the data presented in Table 4.3-5, the outdoor watering season generally begins around April, peaks in July and August, and ends in November. Obviously, for any particular year, this outdoor water use cycle is greatly affected by hydrologic conditions for the year. Minimum water use occurs from December through March, and appears to be relatively stable during this period.

Also presented in Table 4.3-5 are the total annual water use (e.g., 4,714.2 million gallons for Santa Rosa), the average monthly (total annual divided by 12 months) water use (e.g., 392.9 million gallons for Santa Rosa), and the December through March average monthly water use

(e.g., 284.6 million gallons for Santa Rosa). The December to March average monthly water use is assumed to represent the indoor water use, because during this period it is unlikely that yard watering or other significant outdoor water uses occur. Also presented are the indoor and outdoor water uses as a percent of the total water use (e.g., 72.4 and 27.6 percent respectively for Santa Rosa), and the indoor average daily water use (e.g., 9.36 mgd for Santa Rosa).

Presented in Table 4.3-6 are the data for the CII water use for Santa Rosa/SPCSD, Rohnert Park, and Sebastopol. The organization of this table is similar to that of Table 4.3-5.

The City of Cotati billing system is unable to breakout the water use by user type for 1994. Thus, data to define residential and CII water use are not available. Presented in Table 4.3-7 is the monthly water production, and an estimate of the monthly water use for Cotati for 1990 through 1992. The water use is estimated as 90 percent of the water produced (as estimated in the MW study). Also presented in Table 4.3-7 are the average monthly water use and the average indoor monthly water use (December through March). The total indoor water use for Cotati has been assumed to be distributed between residential and CII uses in the same proportion as Rohnert Park.

The indoor water use data presented in Tables 4.3-5, 4.3-6 and 4.3-7 are summarized in Table 4.3-8. The combined residential water use is about 13.37 mgd, or about 76.8 percent of the total indoor water use. The combined CII water use is about 4.05 mgd, or about 23.2 percent of the total indoor water use.

The ADWF for the past eight years for Santa Rosa, Sebastopol, and SPCSD, and the combined wastewater flow of Rohnert Park, Cotati, and Sonoma State University (SSU, the 1994 SSU ADWF was 0.115 mgd) are presented in Table 4.3-9. The dry weather period for this area has been assumed to be July through October. Overall during the last 8 years, the ADWF to the Laguna WWTP, excluding flow treated at Oakmont WWTP, has increased from 14.91 to 16.84 mgd (approximately 1.5 percent increase per year).

A comparison of the estimated indoor water use with the 1994 ADWF for Santa Rosa/SPCSD, Rohnert Park/Cotati, and Sebastopol is contained in Table 4.3-10. The wastewater flows for Santa Rosa and SPCSD were combined for comparison with the combined indoor water use. The water use of Rohnert Park and Cotati were combined to compare with their combined wastewater flow. The ADWF values are slightly lower than the average indoor water uses, which is to be expected, and overall these data support each other as reasonable values.

Because the indoor water use and ADWF are similar, it is reasonable to assume that the distribution (as residential and CII) of the wastewater flow is similar to that of indoor water use. Table 4.3-11 contains the total ADWF data (from Table 4.3-9) and the ADWF distributed between residential and CII in the same proportion (proportions from Table 4.3-8) as the indoor water use. Also shown are the number of DUs and the number of jobs or employees (CII) for 1994 (from Table 4.3-4). Using the ADWF and the number of DUs or employees, the 1994 wastewater flow generation factors have been determined as shown in Table 4.3-11. For example, the Santa Rosa ADWF treated at the Laguna and Oakmont WWTP is 12.79 mgd, the residential proportion is 74.2 percent or 9.52 mgd. In 1994 there were 49,501 DUs contributing

flow to the WWTP. Thus, the resulting 1994 residential ADWF generation factor is 192.3 gallons per day per DU.

SSU is located east of the City of Rohnert Park and lies contiguous to the City's sphere of influence boundary. The University's wastewater is collected and pumped to the Laguna WWTP by Rohnert Park. The 1994 wastewater flow from the University was about 0.115 mgd (about 2.7 percent of the combined Rohnert Park/Cotati flow of 3.77 mgd). The SSU flow has been subtracted from the Rohnert Park/Cotati flow in Table 4.3-11. As shown in Table 4.3-1, the University's 1994 flow of 0.115 mgd was generated by about 5,800 full time students (or the equivalent), resulting in a per student flow of 19.8 gal/day/student. The University expects an ultimate student population of about 10,000 full time students (or the equivalent), which would result in an ADWF of about 0.20 mgd. The University has already implemented several water conservation programs including LFSH, low flow toilets, and leak identification and correction. These programs will also be implemented in new facilities constructed on campus. Thus, the SSU flow factor of 19.8 gallons/day/student already includes water conservation, and the flow factor is not expected to decrease significantly in the future.

4.2 WATER CONSERVATION / WASTEWATER FLOW REDUCTION

In this subsection, State of California water conservation legislation, Member Entity water conservation programs, and other programs are reviewed. Also, the effects of these laws and programs on the wastewater flow generation factors shown in Table 4.3-11 are estimated.

4.2.1 State of California Water Conservation Legislation

The California Energy Commission adopted water conservation standards for new shower heads and faucets on January 1, 1979. The standards established a maximum flow of 2.75 to 3.00 gallons per minute for shower heads (depending upon pressure), and 2.75 gallons per minute for faucets. In 1992, the California Energy Commission adopted more stringent conservation standards, including 2.5 gpm or less for shower heads at 20 to 80 psi, and 2.2 gpm for sink faucets.

On January 1, 1992, the State of California required that ultra-low-flow toilets be installed in all new construction (AB2355). On January 1, 1994, the State of California required that all toilets sold in California must be Ultra Low Flow Toilets (ULFT, 1.6 gallons per flush) (SB1224).

4.2.2 California Urban Water Conservation Council Best Management Practices

The legislation listed above stemmed in part from the impact of the recent drought (1988-92). The drought also prompted a coordinated effort by the California Department of Water Resources, water utilities, environmental organizations, and other interested groups to develop a list of Best Management Practices (BMPs) for conserving water. This coalition of interested parties produced a Memorandum of Understanding (MOU), prepared by the California Urban Water Conservation Council, which identified 16 BMPs for achieving water conservation. The MOU laid the foundation for implementation of these BMPs by the parties signing the

document. In 1991, agencies began signing the MOU, demonstrating their commitment to implementation of the BMPs.

The 16 BMPs included in the MOU are listed in Table 4.3-12, as is the current level of implementation of each BMP by each of the Subregional System Member Entities. Those water conservation measures which offer quantifiable and sustainable water savings are also identified in Table 4.3-12. Although the BMPs were initiated to assist water utilities in achieving water management goals, some of the BMPs provide significant indoor water savings and thus reduce wastewater flow generation. The conservation measures that impact wastewater flow generation or have wastewater saving potential are denoted within the parenthesis in the last column of this table.

Of the 16 water conservation BMPs, five were considered to have a quantifiable and sustainable wastewater reduction potential. These five BMPs are shown in **bold face type** in Table 4.3-12 and discussed below.

BMP 1 - Interior/Exterior Water Audits & Incentive Programs for Single Family, Multi-Family, and Government Institutions

The goal of water audits is to identify ways that individual water users can reduce their water use. Implementation methods are to be at least as effective as identifying the top 20 percent of water users and directly contacting them by mail or phone and offering to perform a water audit. Incentives (like free showerheads or adjustments to high water use bills) to achieve customer implementation should be offered. This should be a cooperative program among organizations that would benefit through its implementation.

BMP 2 - Plumbing, New and Retrofit

2a) Enforcement of water-conserving plumbing fixture standards including requirement for Ultra-Low-Flush Toilets (ULFTs) in all new construction. Local building departments, inspectors, developers, and plumbing supply outlets are to be contacted and informed of the standards.

2b) Support of State and Federal legislation prohibiting sale of toilets using more than 1.6 gallons per flush. Local building departments, inspectors, developers, and plumbing supply outlets are to be contacted and informed of the laws.

2c) Plumbing Retrofit. The goal of retrofit programs is to replace inefficient fixtures with conservation fixtures. Implementation should be at least as effective as delivering retrofit kits, toilet displacement devices, and low flow shower heads to pre 1980 homes.

BMP 4 - Metering with Commodity Rates for all New Connections and Retrofit of Existing Connections

The purpose of metering and commodity rate programs is that if people have to pay for the water based upon the quantity of water used, they will have an incentive to reduce their water use.

BMP 9 - Commercial and Industrial Water Conservation

This program consists primarily of commercial and industrial water audits. At least the top 10 percent of commercial and industrial water users are to be contacted directly and water audits and incentives are to be offered. Audits should be followed up at least every 5 years.

BMP 16 - Ultra Low Flush Toilet Replacement

The goal of replacement programs is to replace high water use toilets with ULFT, thereby reducing water use. Implementation is to be at least as effective as offering rebates of up to $100 for each toilet replaced that would not have otherwise been replaced.

4.2.3 Member Entity Conservation Programs

The current Member Entity water conservation programs consist primarily of water audits, rebate and retrofit programs, and replacement programs. Discussed below are the programs implemented by each Member Entity.

Santa Rosa

Santa Rosa has aggressively pursued water conservation through the following conservation programs:

- Implementation of a residential and CII water audit program. Santa Rosa has an audit program, although it does not include all the elements of the CUWCC BMP #1.

- Aggressive enforcement of the conservation fixtures laws.

- Metering of all water services with a commodity rate price structure.

- An aggressive toilet and shower head replacement program. In 1992-1993, Santa Rosa participated in an evaluation of low flow fixtures and provided test sites for a pilot toilet retrofit project. The City also has a shower head exchange program. As of May 1994, these programs have resulted in over 10,000 showerheads and over 1,670 toilets being replaced. In May 1994, the BPU and the Santa Rosa City Council approved a 5-year city-wide plumbing rebate program, which began in May of 1995. The program is expected to upgrade approximately 19,800 residential units (or the equivalent).

Rohnert Park

The Rohnert Park conservation programs include:

- Aggressive enforcement of the conservation fixtures laws. In 1990, Rohnert Park was successful in negotiating with the major residential building contractors to voluntarily install ultra-low-flow toilets (ULFTs) in new developments. Approximately 481 new residential homes were provided with ULFTs in 1990/91.

- Metering of all water connections except single family residential constructed prior to January 1, 1992.

- A toilet and shower head replacement program. In 1992, Rohnert Park developed and implemented a toilet retrofit and low-flow shower head (LFSH) replacement program. The toilet retrofit device is a flapper valve, which reduces the water use to about 1.5 gallons per flush. Through the retrofit program, about 4,700 shower heads have been replaced to date. Recently, there has been very little demand for the retrofit hardware, and consequently, the program will be concluded soon. No additional retrofits are expected under this program.

Cotati

The Cotati conservation programs include:

- Aggressive enforcement of the conservation fixtures laws.

- Metering of all water connections. However, Cotati's billing system is unable to provide a detailed breakdown of water use by user type for 1994.

- Toilet and shower head replacement program. As part of the approval for construction of each new DU, Cotati collects a fee used to retrofit 4 existing DUs with ULFTs and LFSH. To date the City has collected about $16,000 under this program and expects to implement the retrofit phase of the program this year.

Sebastopol

The Sebastopol conservation programs include:

- Aggressive enforcement of the conservation fixtures laws.

- Metering of all water connections with a commodity rate price structure.

- Toilet replacement program which has resulted in about 143 toilet replacements from 1988 through 1994. Sebastopol was recognized as the first city in the Sonoma valley to offer a rebate program. Also in 1988, Sebastopol conducted a mass-mailing of conservation kits, which included flow restriction devices for shower heads, toilet bags, and general information on efficient water use.

4.2.4 Sonoma County Water Agency Water Conservation Programs

Santa Rosa, Rohnert Park, and Cotati contract with the Sonoma County Water Agency (SCWA) for water supply and thus are affected by SCWA's programs. Sebastopol, however, obtains all of its water supply from groundwater.

Since the early 1980's, SCWA has provided water conservation information and education to its service area customers. Most of the conservation programs that SCWA has initiated were directed towards public information for motivating voluntary customer conservation. For example, conservation kits that help customers detect leaks in toilets and incorporate water saving behavior into daily routines were made available. It is assumed that the results of these programs had a greater impact on outside water use (e.g., reduction of overwatering lawns, installation of water efficient landscaping, and not wasting water while washing cars) than inside water usage.

Another successful program developed by the SCWA is the school education program. Since 1983, the agency has participated in programs for educating children and distributed materials regarding efficient water practices. In general, the school education program is inexpensive and may be the best way to target the future water user market.

In the future, SCWA will continue its commitment to provide information to the public and participate in specific conservation programs and events to achieve long-term water conservation.

4.2.5 Evaluation of Wastewater Reduction Potential for Existing Conservation Programs

The existing conservation programs of Subregional System Member Entities consist of primarily installing water saving fixtures in residential dwelling units. The two fixtures that are most commonly installed and that have the most potential to achieve long-term quantifiable and sustainable wastewater flow reduction are:

- Low Flow Shower Head (LFSH) retrofits

- Ultra Low Flow Toilet (ULFT) retrofits

The mechanisms for replacement of shower heads and toilets include their intentional replacement to save water (retrofitting), and natural replacement as existing showerheads or toilets break, become unusable, or are replaced for other reasons (e.g., remodeling).

LFSH Replacement

One of the largest indoor uses of water is for showering and bathing, consuming approximately 30 percent of the total indoor water use. Conventional shower heads have flow rates of 3 to 5 gallons per minute (gpm). A LFSH will reduce the water flow to about 2.5 gpm or less depending upon the water pressure. The water savings from 1980 to 1992 era shower heads is about 3.4 gal per capita per day (gpcd) and about 7.2 gpcd for post-1992 era shower heads.

Toilet Replacement

Another large indoor use of water is for flushing of toilets. Reduction of water use by toilet replacement has received the most emphasis in the recent past because water use for toilets accounts for 33 percent of the indoor water use. Non-conserving, older style toilets use as much as 5.5 gallons per flush (gpf). From 1980 until 1994, many water conserving toilets (using 3.5 gpf) were used in construction of homes. As of January 1, 1994, ULFT (1.6 gpf) are required to be installed in all new homes.

Presented in Exhibit A are 6 spread sheets used to estimate the reduction in residential and CII wastewater flow factors for Santa Rosa/SPCSD, Rohnert Park/Cotati, and Sebastopol resulting from the water conservation programs of each of the Member Entity programs described above and replacement resulting from the state law. Exhibit A also contains a brief explanation of the spreadsheet. Summarized in Table 4.3-13 are the wastewater flow factors which resulted from the calculations in these spreadsheets. Each of the wastewater flow factors decreases through time as older toilets and shower heads are replaced with LFSHs and ULFTs, and as all new DUs are built with LFSH and ULFT. CII wastewater flow factors decrease through construction of new facilities with conservation fixtures. Additionally, Santa Rosa provides audit and retrofit programs to CII water users which further decreased their CII factor.

4.3 PROJECTED WASTEWATER FLOWS

Using the flow factors from Table 4.3-13 and the demographic data from Table 4.3-4 wastewater flows at buildout of the Member Entity General Plans were estimated. The resultant projected wastewater flows are presented in Table 4.3-1. As shown, the Subregional System ADWF at buildout of the Member Entity General Plans is 21.34 mgd, or a 25 percent increase over the 1994 ADWF.

The conservation programs of the Member Entities have already produced a significant decrease in the ADWF, and will produce an even larger reduction in ADWF in the future. Presented in Table 4.3-2 is the estimated current and buildout ADWF if the Member Entities had not implemented their water conservation programs and enforced state laws. Without conservation (without the use of low flow toilets, LFSH, and water meters with commodity pricing), the current wastewater ADWF would be about 19.05 mgd, or about 11 percent above the actual current ADWF. Without conservation, at buildout the ADWF would be about 26.12 mgd, or about 22 percent above that with conservation.

4.3.1 Assumptions Made in ADWF Projection

As is always necessary when events of the future are to be predicted, some assumptions about future occurrences are required to project future wastewater flows. The assumptions made in this analysis are identified below.

- 10 percent of the water produced by Rohnert Park and Cotati was assumed lost in the distribution system or is unaccounted for water (UAW). For western utilities, UAW is usually about 5 to 15 percent of the water produced. UAW generally includes uses for fire fighting, water main flushing, leakage, and unauthorized (or unmetered) uses. A value of 10 percent is consistent with the estimate made by Montgomery Watson in their Water Use Study, Draft dated March 30, 1994, prepared for Sonoma County Water Agency.

- Indoor water use was assumed to be equal to the total water use in the months of December through March because it is likely that there is little or no outdoor water use during these winter months.

- Indoor water use for Cotati was assumed to be distributed proportionally to the indoor water use distribution (between residential and CII) of Rohnert Park because Cotati's billing system is unable to break out the water use by user type for 1994.

- The ADWF of the individual Member Entities was assumed to be distributed between residential flow and CII flow in the same proportion as the indoor water use of the individual Member Entities.

- The demographic data used are taken from several sources, the sources are not always consistent with each other. Thus, the most consistent data was identified and used. The data used and sources are shown in Table 4.3-4.

- In a Letter from Bill Maddaus to "Distribution," dated August 24, 1994, a savings factor for replacement of 5-7 gpf toilets with 1.6 gpf toilets was estimated to be about 14.7 percent of current flow. A savings factor for replacement of 3.5 gpf toilets with 1.6 gpf toilets was estimated to be about 10.8 percent. The savings of 3.5 gpf toilets over 5-7 gpf toilets (5.5 gpf assumed) is about 2 gpf. This is similar to the savings for replacement of 3.5 gpf toilets with 1.6 gpf toilets (1.9 gpf), thus a savings factor of 10.8 percent has been assumed for use of 3.5 gpf toilets over 5.5 gpf toilets. In exhibit A of this Technical Memorandum, these savings factors have been converted into per capita savings factors for each of the Member Entities.
- LFSH savings were assumed to be 3.4 gpcd for 1980 to 1992 era showerheads and 7.2 gpcd for post 1992 era showerheads. Based upon the housing distributions (from Table 4.3-4) and the estimated penetration rate for showerheads (5 percent per year), average LFSH savings factors have been estimated for each Member Entity for 1994 and for buildout of the General Plans (See Exhibit A).
- Water meters in and of themselves do not reduce water use. They do, however, provide water users an incentive to install LFSH and ULFT which result in decreased water use. Additionally, water meters can result in changing peoples behavior which result in reducing

water use (for example, preventing people from leaving the water running while washing a car or brushing their teeth). It was assumed that a 1 percent reduction in wastewater flow occurs (in addition to the reduction from conservation fixtures) as a result of having water meters and commodity pricing. Also, lack of metering results in less incentive to replace nonconserving fixtures with conserving fixtures, and therefore lower annual penetration rates have been used for nonmetered connections as discussed below.

- In a response to comments (dated April 28, 1994) on the Montgomery Watson Water Use Study, Technical Memorandum No. 1, it was assumed that the current penetration of LFSH is 60 percent and the annual replacement rate is 5 percent per year. Also, the current toilet type penetration was estimated based upon a natural replacement rate of 3 percent per year. The resulting toilet distribution is:

• 5.5 gpf toilets	Pre 1980	55 percent penetration
	1980 to 1993	0 percent penetration
	Post 1993	0 percent penetration
• 3.5 gpf toilets	Pre 1980	40 percent penetration
	1980 to 1993	90 percent penetration
	Post 1993	0 percent penetration
• 1.6 gpf toilets	Pre 1980	5 percent penetration
	1980 to 1993	10 percent penetration
	Post 1993	100 percent penetration

  These values have been used for all the Member Entities except Sebastopol, because Sebastopol negotiated with developers to use ULFT in 1990. Therefore, the 3.5 gpf, 1980 to 1993 value was decreased to 80 percent, and the 1.6 gpf, 1980 to 1993 value was increased to 20 percent.

- The 1994 to Buildout Fraction of Natural Replacement Replaced Through the Retrofit Program for toilets is to ensure that no replacements are counted twice (as natural replacements and retrofit program replacements). The value of 0.2 was an estimate by Virginia Porter of Santa Rosa's Water Conservation Department for the Santa Rosa Program. The value of 0.2 means that 20 percent of the toilets that would be replaced through natural replacement are actually replaced through the retrofit program, and thus are not replaced through natural replacement. Consequently, the quantity of toilets replaced by natural replacement is reduced by 20 percent. This value was used for the other Member Entities as well, except Sebastopol. For Sebastopol a value of 0.30 was used because under Sebastopol's retrofit program, fixtures replaced during a remodel are eligible for a rebate.

- The 1994 to Buildout Fraction of Natural Replacement Replaced Through the Retrofit Program for shower heads is to ensure that no replacements are counted twice (as natural replacements and retrofit program replacements). A value of 0.1 is used for Santa Rosa, because Virginia Porter indicated that many of the DUs retrofit with toilets already have LFSH. Thus, the retrofit program will have a smaller affect on the natural replacement of

shower heads. A value of 0.2 was used for Rohnert Park and Cotati. A value of 0.0 was used for Sebastopol because Sebastopol does not have a shower head retrofit program.

- Only existing retrofit programs have been evaluated. In other words, it was assumed that the existing programs will not be expanded or extended.

4.3.2 Water Conservation Effects on Reclaimed Water Salinity

The effects of water conservation on the salinity of the reclaimed water were evaluated by CH2M Hill in a Technical Memorandum by Dan Fox dated February 8, 1993. It was concluded that for conservation levels greater than 20 percent beyond the 1993 level of conservation, some sensitive crops may be impacted by increased salinity.

The buildout conservation flow of 20.90 mgd represents about a 12 percent increase in conservation beyond the 1994 level of conservation. Thus, there should be no significant impact on increased salinity from water conservation.

Table 4.3-1

Projected Average Dry Weather Wastewater Flow with Water Conservation

	1994			Buildout of the General Plan		
	Quantity (DU) (employees)	Flow Generation Factor (gal / day / DU) (gal / day / employee)	Proj. Flow (mgd)	Quantity (DU) (employees)	Flow Generation Factor (gal / day / DU) (gal / day / employee)	Proj. Flow (mgd)
Santa Rosa & SPCSD						
Residential	49,501	192.3[1]	9.52[1]	72,900	171.4	12.49
Commercial/Industrial /Institutional	79,467	40.5	3.22	98,500	35.5	3.50
County Septage Agreement						0.32
Santa Rosa Total			12.74			16.31
Rohnert Park						
Residential	13,978	192.8	2.69	15,510	171.7	2.66
Commercial/Industrial /Institutional	14,166	30.8	0.44	20,000	28.2	0.57
Sonoma State Univ.	5,800 Stu	19.8 gal/day/Stu	0.115	10,000 Stu	19.8 gal/day/Stu	0.20
Rohnert Park Total			3.24			3.43
Cotati						
Residential	2,544	192.8	0.49	4,066	171.7	0.69
Commercial/Industrial /Institutional	1,412	30.8	0.04	2,331	28.2	0.07
Cotati Total			0.53			0.76
Sebastopol						
Residential	3,015	126.0	0.38	4,359	109.3	0.48
Commercial/Industrial /Institutional	5,282	41.7	0.22	6,600	38.9	0.26
Sebastopol's Remaining Current Capacity						0.10
Sebastopol Total			0.60			0.84
Total						
Residential	69,258		13.08	96,835		16.74
Commercial/Industrial /Institutional	100,327		4.03	127,431		4.60
Subregional System Total			17.11			21.34

West Yost & Associates, 1995

[1] Includes an increase of 0.32 mgd for flow treated at Oakmont WWTP and a decrease of 0.05 mgd for flow currently generated under the agreement to treat County septage.

Table 4.3-2

Projected Average Dry Weather Wastewater Flow without Water Conservation[1]

	1994			Buildout of the General Plan		
	Quantity (DU) (employees)	Flow Generation Factor (gal / day / DU) (gal / day / employee)	Proj. Flow (mgd)	Quantity (DU) (employees)	Flow Generation Factor (gal / day / DU) (gal / day / employee)	Proj. Flow (mgd)
Santa Rosa & SPCSD						
Residential	49,501	215.0	10.64	72,900	214.6	15.64
Commercial/Industrial /Institutional	79,467	43.7	3.48	98,500	43.7	4.31
Santa Rosa Total			14.02			19.95
Rohnert Park						
Residential	13,978	217.7	3.04	15,510	217.7	3.38
Commercial/Industrial /Institutional	14,166	34.9	0.50	20,000	34.9	0.70
Sonoma State Univ.	5,800 Stu	19.8 gal/day/Stu	0.115	10,000	19.8 gal/day/Stu	0.20
Rohnert Park Total			3.66			4.28
Cotati						
Residential	2,544	217.7	0.55	4,066	217.7	0.89
Commercial/Industrial /Institutional	1,412	34.9	0.05	2,331	34.9	0.08
Cotati Total			0.60			0.97
Sebastopol						
Residential	3,015	141.4	0.43	4,359	141.4	0.62
Commercial/Industrial /Institutional	5,282	45.2	0.24	6,600	45.2	0.30
Sebastopol Total			0.67			0.92
Total						
Residential	69,258		14.66	96,384		20.53
Commercial/Industrial /Institutional	100,327		4.39	127,431		5.59
Subregional System Total			19.05			26.12

West Yost & Associates, 1995

[1] The without conservation flow is the flow without use of low flow toilets or shower heads, and without implementation of water metering with commodity rate structures and without audit programs.

Table 4.3-3

Capacity Allocation for the Subregional System[1]

Member Entity	Capacity Allocation (mgd)	Percent of Total
Santa Rosa	12.07	67.1
Rohnert Park	3.22	17.9
Cotati	0.62	3.4
Sebastopol	0.84	4.7
South Park Sanitation District	1.25	6.9
Total	18.0	100

Miles A. Ferris, Director of Utilities, Santa Rosa

[1] Capacity allocation based upon Amendment No. 3 to the Subregional Agreement as summarized in the January 17, 1995 memorandum by Miles A. Ferris, Director of Utilities to the Technical Advisory Committee.

Table 4.3-4

Demographic Data[1]

Data Item	Source	Value
Santa Rosa		
1980 Dwelling Units	CDOF	33,573
1990 Dwelling Units	CDOF	45,460
1994 Dwelling Units	CDOF	49,501
Buildout Dwelling Units	EPS Memorandum	72,900
Santa Rosa/County Septage Agreement	Miles Ferris	0.321
Current flow served under septage agreement.	Dan Carlson (264 Dus @192 gpd/DU)	0.05
1994 Density	CDOF	2.49
Buildout Density	EPS Memorandum	2.39
1980 Employees	EPS Memorandum	55,926
1990 Employees	General Plan (p III-21) Linear extrapolation from the 1991 value to 1990	74,711
1994 Employees	General Plan (p III-21) Linear interpolation between the 1991 and 2010 values	79,467

Table 4.3-4

Demographic Data[1]

Data Item	Source	Value
Buildout Employees	EPS Memorandum	98,500
Rohnert Park		
1980 Dwelling Units	CDOF	8,291
1990 Dwelling Units	CDOF	13,368
1994 Dwelling Units	CDOF	14,198
Buildout Dwelling Units	EPS Memorandum	15,510
Unsewered Dwelling Units	Ron Brust (Cannon Manor Subdivision)	220
1994 Density	CDOF	2.70
Buildout Density	EPS Memorandum	2.67
1980 Employees	EPS Memorandum	5,280
1990 Employees	General Plan (p 4-27) Linear interpolation between the 1982 and 1992 values.	11,300
1994 Employees	General Plan (p 4-27) Linear interpolation between the 1992 and 2010 values.	14,166
Buildout Employees	EPS Memorandum	20,000
1994 SSU Students	John Bond, SSU	5,800
Buildout SSU Students	John Bond, SSU	10,000
Cotati		
1980 Dwelling Units	CDOF	1,339
1990 Dwelling Units	CDOF	2,257
1994 Dwelling Units	CDOF	2,544
Buildout Dwelling Units	EPS Memorandum	4,066
Unsewered Dwelling Units	Paul Schoch	27[2]
1994 Density	CDOF	2.56
Buildout Density	EPS Memorandum	2.62
1980 Employees	EPS Memorandum	844
1990 Employees	EPS Memorandum	1,380
1994 Employees	EPS Memorandum - Interpolated to 1994.	1,412
Buildout Employees	EPS Memorandum	2,331
Sebastopol		
1980 Dwelling Units	CDOF	2,358
1990 Dwelling Units	CDOF	2,843
1994 Dwelling Units	CDOF	3,015
Buildout Dwelling Units	EPS Memorandum	4,359[3]

Table 4.3-4

Demographic Data[1]

Data Item	Source	Value
Unsewered Dwelling Units	Dan Carlson	0
1994 Density	CDOF	2.42
Buildout Density	EPS Memorandum	2.39
1980 Employees	EPS Memorandum	3,220
1990 Employees	General Plan (p I-5, Figure 3).	4,770
1994 Employees	General Plan (p I-5, Figure 3) Linear interpolation between the 1990 and 2000 values.	5,282
Buildout Employees	EPS Memorandum	6,600

Compiled by West Yost & Associates, 1995

[1] The EPS memorandum presents General Plan data and ABAG data. For the ADWF projection, preference was always given to General Plan data over ABAG data.

[2] Although there are actually about 55 unsewered DUs in Cotati, only about half (27) of them will be sewered by the year 2010.

[3] Although Sebastopol's growth management plan limits the rate of growth to 575 DUs through buildout (resulting in only 3,627 DUs) , the General Plan land use and housing density would result in 4,359 DUs at buildout. To be conservative, the larger value of 4,359 DUs is used in this wastewater projection.

Table 4.3-5

Average Monthly Residential Water Use[1]

Month	Santa Rosa and SPCSD (mil gal)	Rohnert Park (mil gal)	Sebastopol (mil gal)
Jan	300.3	95	13.5
Feb	256.6	91.3	15
Mar	265	93.7	12.1
Apr	296.4	108.6	15.6
May	404.6	143.8	18.1
Jun	472.2	156.2	24.7
Jul	517.4	189	26.9
Aug	540.3	186.8	26.2
Sep	533.1	147.7	27.3
Oct	459.7	151.1	24.9
Nov	352.1	102.6	17.7
Dec	316.5	97.6	15.4
Total	4714.2	1563.4	237.4
Average	392.9	130.3	19.8
Dec-Mar (Indoor) Average	284.6	94.4	14.0
Percent Indoor	72.4	72.5	70.8
Percent Outdoor	27.6	27.5	29.2
Average Indoor Daily Flow (mgd)[2]	9.36	3.10	0.46

Compiled by West Yost & Associates, 1995

[1] Average monthly water use based upon uses in years 1990 through 1994.
[2] Average indoor daily flow is calculated as 12 times the average indoor monthly flow divided by 365 days.

Table 4.3-6

Average Monthly Commercial, Industrial, and Institutional Water Use[1]

Month	Santa Rosa and SPCSD (mil gal)	Rohnert Park (mil gal)	Sebastopol (mil gal)
Jan	98	15.1	5.9
Feb	87.2	13.7	9.1
Mar	98.8	12.3	4.7
Apr	102.2	23.6	9.5
May	152.2	31.1	6.9
Jun	184.7	33.3	13.1
Jul	222.2	40.1	8.7
Aug	214.3	44.9	15.1
Sep	219.1	39.4	11.7
Oct	189.4	29.7	18
Nov	136.9	20.2	6.5
Dec	111.6	15.5	11.9
Total	1816.6	318.9	121.1
Average	151.4	26.6	10.1
Dec-Mar (Indoor) Average	98.9	14.2	7.9
Percent Indoor	65.3	53.2	78.3
Percent Outdoor	34.7	46.8	21.7
Average Indoor Daily Flow (mgd)[2]	3.25	0.47	0.26

Compiled by West Yost & Associates, 1995

[1] Average monthly water use based upon uses in years 1990 through 1994.
[2] Average indoor daily flow is calculated as 12 times the average indoor monthly flow divided by 365 days.

Table 4.3-7

City of Cotati Monthly Water Production and Estimated Water Use[1]

Month	1990 Water Production (mil gallons)	Water Use (mil gallons)	1991 Water Production (mil gallons)	Water Use (mil gallons)	1992 Water Production (mil gallons)	Water Use (mil gallons)	Avg. Water Production (mil gallons)	Avg. Water Use (mil gallons)	Water Use (mgd)
January	16.72	15.05	18.17	16.35	16.76	15.08	17.22	15.50	0.51
February	15.76	14.18	17.05	15.35	15.35	13.82	16.05	14.45	0.52
March	18.32	16.49	16.03	14.43	14.92	13.43	16.42	14.78	0.48
April	25.94	23.35	21.93	19.74	21.02	18.92	22.96	20.67	0.68
May	28.74	25.87	28.21	25.39	30.2	27.18	29.05	26.15	0.86
June	30.34	27.31	30.76	27.68	38.54	34.69	33.21	29.89	0.98
July	37.96	34.16	36.91	33.22	36.44	32.80	37.10	33.39	1.09
August	34.87	31.38	31.45	28.31	40.82	36.74	35.71	32.14	1.05
September	31.46	28.31	32.82	29.54	33.79	30.41	32.69	29.42	0.96
October	31.53	28.38	20.64	18.58	25.96	23.36	26.04	23.44	0.77
November	21.73	19.56	25.22	22.70	19.94	17.95	22.30	20.07	0.66
December	20.07	18.06	20.72	18.65	15.78	14.20	18.86	16.97	0.56
						Average Monthly Use			0.76
						Average Indoor Use (Dec, Jan, Feb, Mar)			0.52

Compiled by West Yost & Associates, 1995

[1] Water use estimated to be 90% of the water production based upon the assumed value for unaccounted for water loss of 10 percent in the Montgomery Watson, March 30, 1994 Water Use Tech. Memo. by William Maddaus.

Table 4.3-8

Indoor Water Use

	Santa Rosa & SPCSD		Rohnert Park & Cotati[1]		Sebastopol		Total	
	Flow (mgd)	Percent (%)	Flow (mgd)	Percent (%)	Flow (mgd)	Percent (%)	Flow (mgd)	Percent (%)
Residential	9.36	74.2	3.55	86.8	0.46	63.9	13.37	76.8
Commercial Industrial Institutional	3.25	25.8	0.54	13.2	0.26	36.1	4.05	23.2
Total Indoor Water Use	12.61	100.0	4.09	100.0	0.72	100.0	17.42	100.0

Compiled by West Yost & Associates, 1995

[1] Cotati flow distribution assumed to be similar to Rohnert Park flow distribution

Table 4.3-9

Average Dry Weather Wastewater Flows[1], mgd

Year	Santa Rosa	Rohnert Park[2]	Sebastopol	South Park Sanitation District	Total ADWF to Laguna WWTP	Oakmont WWTP	Total ADWF Flow
1987	10.10	3.18	0.58	1.05	14.91	--	14.91
1988	10.33	3.25	0.57	1.07	15.22	--	15.22
1989	10.54	3.36	0.59	1.09	15.58	--	15.58
1990	10.48	3.70	0.59	1.08	15.85	--	15.85
1991	11.17	3.55	0.57	1.11	16.40[3]	0.39	16.79[3]
1992	11.26	3.60	0.58	1.16	16.60	0.39	16.99
1993	11.21	3.74	0.60	1.18	16.73	0.40	17.13
1994	11.30	3.77	0.60	1.17	16.84	0.32	17.16

City of Santa Rosa, Laguna WWTP, 1994

1 Dry Weather Period is assumed to be July through October.

2 The City of Rohnert Park subcontracts with the City of Cotati and Sonoma State University. This value represents the combined flow of these three entities. The 1994 ADWF from SSU was 0.115 mgd.

3 Flowmeters recalibrated, refer to CH2M Hill Tech Memo, dated December 19, 1994.

Table 4.3-10

Comparison of Indoor Water Use and Dry Weather Wastewater Flow

Water Uses / Wastewater Flow	Santa Rosa plus SPCSD	Rohnert Park plus Cotati	Sebastopol	Total
Indoor Water Use[1]	12.61	4.09	0.72	17.42
Average Dry Weather Wastewater Flow[2]	12.79[3]	3.77	0.60	16.84
Difference	0.18	0.32	0.12	0.58
Difference as a Percent of Indoor Water Use	1	8	17	3

Compiled by West Yost & Associates, 1995

[1] From Table 8
[2] From Table 9
[3] Includes 0.32 mgd residential flow treated at Oakmont WWTP

Table 4.3-11

1994 Wastewater Flow Factors

Water Uses / Wastewater Flow	Santa Rosa plus SPCSD	Rohnert Park plus Cotati	Sebastopol	Total
Average Dry Weather Wastewater Flow[1], mgd	12.79	3.66[2]	0.60	16.84
Residential				
Residential Indoor Water Use Percentage[3], percent	74.2	86.8	63.9	
Average Dry Weather Residential Wastewater Flow, mgd	9.52[4]	3.18	0.38	13.13
Number of Dwelling Units (DU)[5]	49,501	16,522	3,015	68,648
1994 Residential Wastewater Flow Factor, gal/day/DU	192.3	192.5	126.0	187.9
Commercial, Industrial, Institutional (CII)				
CII Indoor Water Use Percentage[3], percent	25.8	13.2	36.1	
Average Dry Weather CII Wastewater Flow, mgd	3.22	0.48	0.22	3.9
Number of CII Employees[3]	79,467	15,578	5,282	100,327
1994 CII Wastewater Flow Factor, gal/day/employee	40.5	30.8	41.7	38.9

Compiled by West Yost & Associates, 1995

[1] From Table 9
[2] Excludes SSU flow of 0.115 mgd.
[3] From Table 8
[4] Includes 0.32 mgd residential flow treated at Oakmont WWTP and excludes 0.05 mgd treated under county septage agreement.
[5] From Table 4

Table 4.3-12

Comparison of Existing Subregional Member Entity Programs to California Urban Water Conservation Council C Best Management Practices

BMP		Santa Rosa	Sebastopol	Rohnert Park	Cotati	South Park Sanitation District	Quantifiable (WW Savings)
1	**Interior/Exterior Water Audits & Incentive Programs for SFR, MFR, Quasi-Public**	**PC**	**NI**	**NI**	**NI**	**NI**	**Yes (Yes)**
2a	**Enforcement of Water Conserving Plumbing Fixture Standards Including ULF Toilets**	**FPP**	**FPP**	**FPP**	**FPP**	**FPP**	**Yes (Yes)**
2b	**Support of State and Federal Legislation Prohibiting Sale of Toilets of >1.6 gal per flush**	**FPP**	**FPP**	**FPP**	**FPP**	**FPP**	**Yes (Yes)**
2c	**Plumbing Retrofit**	**PC**	**PC**	**PC**	**PC**	**PC**	**Yes (Yes)**
3	Distribution System Water Audits, Leak Detection and Repair	FPP	NI	NI	NI	NI	Yes (No)
4	**Metering w/Commodity Rates for all new Connections and Retrofit of Existing Connections**	**FPP**	**FPP**	**PC**	**FPP**	**FPP**	**Yes (Yes)**
5	Large Landscape Water Audits	PC	NI	NI	NI	NI	Yes (No)
6	Landscape Water Conservation Requirements for New and Existing Comm, Ind, Instit, Govnmt, & Multi-Fam Developments	FPP	FPP	FPP	FPP	FPP	Yes (No)
7	Public Education	FPP	FPP	FPP	FPP	FPP	No
8	School Education	FPP	FPP	FPP	FPP	FPP	No

FPP = Full Program in Place
PC = Partial Compliance
NI = Not Implemented

NOTE: Continued on next page

Table 4.3-12

Comparison of Existing Subregional Member Entity Programs to California Urban Water Conservation Council C Best Management Practices

	BMP	Santa Rosa	Sebastopol	Rohnert Park	Cotati	South Park Sanitation District	Quantifiable (WW Savings)
9	**Commercial/Industrial Water Conservation**	**PC**	**NI**	**NI**	**NI**	**PC**	**Yes (Yes)**
10	New Commercial/Industrial Water Use Review	NI	NI	NI	NI	NI	No
11	Conservation Pricing	FPP	FPP	PC	FPP	PC	No
12	Single Family Landscape Conservation	NI	NI	NI	NI	NI	No
13	Water Waste Prohibition	PC	NI	FPP	NI	NI	No
14	Water Conservation Coordinator	FPP	NI	FPP	NI	NI	No
15	Financial Incentive	NI	NI	NI	NI	NI	No
16	**Toilet Replacement with Ultra-Low-Flow Toilets**	**FPP**	**FPP**	**NI**	**NI**	**FPP**	**Yes (Yes)**

Compiled by West Yost & Associates, 1995

FPP = Full Program in Place
PC = Partial Compliance
NI = Not Implemented

Table 4.3-13

Wastewater Flow Factors Adjusted for Effects of Current Water Conservation Programs[1]

	Flow Factors (gal/DU/day)[2]					
	Residential (gal/day/DU)			CII (gal/day/employee)		
Member Entity	1994	Buildout	Non-Conservation	1994	Buildout	Non-Conservation
Santa Rosa/SPCSD	192.3	171.4	214.6	40.5	35.5	43.7
Rohnert Park/Cotati	192.8	171.7	217.7	30.8	28.2	34.9
Sebastopol	126.0	109.3	141.4	41.7	38.9	45.2

West Yost & Associates, 1995

[1] The without conservation flow is the flow without use of low flow toilets or shower heads, and without implementation of water metering with commodity rate structures and without audit programs

[2] Summarized from the spreadsheets in Exhibit A

Appendix A - Demographic Data

Economic & Planning Systems
August 9, 1995 Memorandum

&

California Department of Finance
Demographic Data

AUG 11 1995

MEMORANDUM

To: Andy Hauge, HBA
Jim Yost, West Yost & Associates
Doug Moore, West Yost & Associates
Bob Duchek, Engineering Science
Rich Maurer, Engineering Science

From: Chuck Teller and Jessica LeVeen

Subject: Final Demographic Data to be used for the Santa Rosa Long-term Wastewater EIR/EIS; EPS #3083

Date: August 9, 1995

This memorandum presents the finalized demographic data to be used Santa Rosa Long-term Wastewater project. The four cities served by the Santa Rosa Wastewater treatment plant, Santa Rosa, Sebastopol, Rohnert Park and Cotati, have reviewed the information we compiled from ABAG *Projections '94* and the General Plans, and have provided any revisions or input. **Table 1** shows the final data for the study area and **Table 2** shows the changes between the final and the draft data we submitted to the Cities for review. The only changes are in the population and housing units data for Sebastopol and Rohnert Park.

SANTA ROSA

Table 3 shows the final data for the city of Santa Rosa and the Sphere of Influence. Santa Rosa informed us to not use the modified persons per household factor. Thus, the 2.39 persons per household factor and the population buildout of 174,500 are based on the City's General Plan.

SEBASTOPOL

Table 4 presents the final data for the city of Sebastopol and the Sphere of Influence. The Sebastopol numbers have been changed to reflect the City's 1994 growth management ordinance. While the General Plan still indicates the buildout numbers we used in the draft data, the buildout projections exceed the sewage treatment capacity and according to the City, a growth management program is needed to stay within the sewage treatment capacity. The City has requested that we use the data based on the growth management residential cap of 575 additional units for the buildout of the City in 20 years. The total

population at buildout will be 8,669 and the total housing units will be 3,627, with 2.39 persons per household.

Sebastopol also the explained the difference between the projected 2010 total employment and the build-out employment because the City has reduced the sphere of influence by 500 acres, and ABAG's *Projections '94* does not reflect this.

ROHNERT PARK

Table 5 shows the demographic data to be used for the city of Rohnert Park and the Sphere of Influence. The population and housing units buildout numbers for the year 2000 have been adjusted down from 44,000 to 41,400, which has also led to a readjustment of the 1995 data. The City predicts slower growth from the year 2000 forward than was previously indicated by ABAG.

COTATI

Table 6 shows the final data for the city of Cotati and the Sphere of Influence. Cotati agreed with all of the projections, so no adjustments to the data have been made.

Table 1
Population, Housing Units and Employment Data for Total Study Area (1)
Santa Rosa Long Term Wastewater Project

Data	1980	1990	1995	2000	2010	Buildout
Population	135,599	177,657	196,800	212,900	243,626	235,218
Persons per Household (2)	2.53	2.53	2.56	2.57	2.54	2.45
Occupied Housing Units (3)	53,630	70,237	76,830	82,680	96,050	96,103
Total Employment	65,270	99,640	106,600	122,900	157,040	127,431
Employment Breakdown						
Agriculture and Mining	2,037	2,150	2,100	2,250	2,230	n/a
Manufacturing and Wholesale	12,251	17,860	19,170	22,300	31,410	n/a
Retail	13,526	20,940	21,170	24,390	30,250	n/a
Service	16,857	29,780	36,420	41,940	54,250	n/a
Other	20,599	28,910	27,740	32,110	38,900	n/a

(1) The total study area includes Santa Rosa and Santa Rosa CDP, Sebastopol, Rohnert Park and Cotati.
(2) Persons per household at buildout is calculated based on the total household population and the occupied housing units.
(3) Occupied housing units is the total number of households.

Source: Association of Bay Area Governments, Projections '94; General Plans of all cities; Economic and Planning Systems, Inc.

Table 2
Change in Population, Housing Units and Employment Data for Total Study Area (1)
Santa Rosa Long Term Wastewater Project

Data	1980	1990	1995	2000	2010	Buildout
Population	0	0	-2,000	-2,600	-2,574	-349
Persons per Household (2)	0	0	0	0	0	0
Occupied Housing Units (3)	0	0	-360	-980	-980	-281
Total Employment	0	0	0	0	0	0

(1) The total study area includes Santa Rosa and Santa Rosa CDP, Sebastopol, Rohnert Park and Cotati.
(2) Persons per household at buildout is calculated based on the total household population and the occupied housing units.
(3) Occupied housing units is the total number of households.

Source: Association of Bay Area Governments, Projections '94; General Plans of all cities; Economic and Planning Systems, Inc.

Table 3
Population, Housing Units and Employment Data for Santa Rosa and Sphere of Influence
Santa Rosa Long Term Wastewater Project

Data	1980	1990	1995	2000	2010	Buildout
Household Population	100,160	126,840	142,000	154,600	177,100	174,500
Persons per Household (1)	2.48	2.49	2.54	2.55	2.52	2.39
Occupied Housing Units (2)	40,433	50,876	55,920	60,640	70,290	72,900
Total Employment	55,926	81,340	85,240	96,230	119,000	98,500
Employment Breakdown						
Agriculture and Mining	1,469	1,560	1,490	1,590	1,570	n/a
Manufacturing and Wholesale	10,741	14,030	15,470	17,110	21,610	n/a
Retail	11,382	17,010	17,080	19,480	22,580	n/a
Service	13,756	24,170	27,790	31,420	40,570	n/a
Other	18,578	24,570	23,410	26,720	32,670	n/a

(1) Persons per household at buildout is calculated based on the total household population and the occupied housing units.
(2) Occupied housing units is the total number of households.

Source: Association of Bay Area Governments, Projections '94; City of Santa Rosa General Plan; Economic and Planning Systems, Inc.

Table 4
Population, Housing Units and Employment Data for Sebastopol
Santa Rosa Long Term Wastewater Project

Data	1980	1990	1995	2000	2010	Buildout	Growth Management Residential Cap (1)
Population	7,252	7,883	8,400	8,900	10,200	10,417	8,669
Persons per Household (2)	2.50	2.53	2.53	2.53	2.49	2.39	
Occupied Housing Units (3)	2,898	3,112	3,320	3,520	4,100	4,359	3,627
Total Employment	3,220	4,890	5,070	6,140	6,810	6,600	
Employment Breakdown							
Agriculture and Mining	407	420	430	460	460	n/a	
Manufacturing and Wholesale	622	780	830	1,100	1,280	n/a	
Retail	675	1,040	1,070	1,100	1,230	n/a	
Service	975	1,800	1,870	2,440	2,570	n/a	
Other	541	850	870	1,040	1,270	n/a	

(1) The buildout numbers exceed the sewage treatment capacity, so the growth management ordinance was drafted and the residential building cap was imposed.
(2) Persons per household at buildout is calculated based on the total household population and the occupied housing units.
(3) Occupied housing units is the total number of households.

Source: Association of Bay Area Governments, Projections '94; City of Sebastopol General Plan; Economic and Planning Systems, Inc.

Table 5
Population, Housing Units and Employment Data for Rohnert Park
Santa Rosa Long Term Wastewater Project

Data	1980	1990	1995	2000	2010	Buildout
Population	24,119	36,862	39,200	41,400	46,826	41,400
Persons per Household (1)	2.74	2.64	2.63	2.67	2.60	2.67
Occupied Housing Units (2)	8,813	13,965	14,900	15,510	18,010	15,510
Total Employment	5,280	12,030	14,870	18,850	28,430	20,000
Employment Breakdown						
Agriculture and Mining	119	120	130	150	150	n/a
Manufacturing and Wholesale	728	2,830	2,630	3,700	7,580	n/a
Retail	1,191	2,340	2,520	3,240	5,640	n/a
Service	1,969	3,550	6,440	7,700	10,440	n/a
Other	1,273	3,190	3,150	4,060	4,620	n/a

(1) Persons per household at buildout is calculated based on the total household population and the occupied housing units.
(2) Occupied housing units is the total number of households.

Source: Association of Bay Area Governments, Projections '94; City of Rohnert Park General Plan; Economic and Planning Systems, Inc.

Table 6
Population, Housing Units and Employment Data for Cotati
Santa Rosa Long Term Wastewater Project

Data	1980	1990	1995	2000	2010	Buildout
Population	4,068	6,072	7,200	8,000	9,500	10,649
Persons per Household (1)	2.74	2.66	2.68	2.66	2.60	2.62
Occupied Housing Units (2)	1,486	2,284	2,690	3,010	3,650	4,066
Total Employment	844	1,380	1,420	1,680	2,800	2,331
Employment Breakdown						
Agriculture and Mining	42	50	50	50	50	n/a
Manufacturing and Wholesale	160	220	240	390	940	n/a
Retail	278	550	500	570	800	n/a
Service	157	260	320	380	670	n/a
Other	207	300	310	290	340	n/a

(1) Persons per household at buildout is calculated based on the total household population and the occupied housing units.
(2) Occupied housing units is the total number of households.

Source: Association of Bay Area Governments, Projections '94; City of Cotati EIR; Economic and Planning Systems, Inc.

Economic & Planning Systems
August 9, 1995 Memorandum
&
August 21, 1995 Update

ECONOMIC & PLANNING SYSTEMS

• Land Economics • Real Estate • Public Finance

EPS

MEMORANDUM

To: Andy Hauge, HBA
Jim Yost, West Yost & Associates
Doug Moore, West Yost & Associates
Bob Duchek, Engineering Science
Rich Maurer, Engineering Science

From: Chuck Teller and Jessica LeVeen

Subject: Update to Final Demographic Data to be used for the Santa Rosa Long-term Wastewater EIR/EIS; EPS #3083

Date: August 21, 1995

This memorandum presents an update to our August 9 memo on the final demographic data to be used for the Santa Rosa Long-term Wastewater project. Further research on Sebastopol's Growth Management Ordinance has indicated that the ordinance does not affect the overall development capacity, but rather, only the annual rate of development. **Table 1** shows the final data for the entire study area and **Table 2** shows the final data to be used for Sebastopol.

SEBASTOPOL

Table 2 presents the final data for the city of Sebastopol and the Sphere of Influence. We will use the buildout numbers based on the General Plan, which states that total population at buildout will be 10,417 and total housing units will be 4,359, with 2.39 persons per household. It is important to note that Sebastopol adopted a growth management ordinance in 1994. The ordinance was adopted to limit the number of housing units that could be built in the next twenty years because the projected housing units would exceed the City's sewage treatment capacity. However, the ordinance only affects the rate at which growth will occur and it does not affect the total buildout capacity within the City and the Sphere of Influence.

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Table 1
Population, Housing Units and Employment Data for Total Study Area (1)
Santa Rosa Long Term Wastewater Project

Data	1980	1990	1995	2000	2010	Buildout
Population	135,599	177,657	196,800	212,900	243,626	236,966
Persons per Household (2)	2.53	2.53	2.56	2.57	2.54	2.45
Occupied Housing Units (3)	53,630	70,237	76,830	82,680	96,050	96,835
Total Employment	65,270	99,640	106,600	122,900	157,040	127,431
Employment Breakdown						
Agriculture and Mining	2,037	2,150	2,100	2,250	2,230	n/a
Manufacturing and Wholesale	12,251	17,860	19,170	22,300	31,410	n/a
Retail	13,526	20,940	21,170	24,390	30,250	n/a
Service	16,857	29,780	36,420	41,940	54,250	n/a
Other	20,599	28,910	27,740	32,110	38,900	n/a

(1) The total study area includes Santa Rosa and Santa Rosa CDP, Sebastopol, Rohnert Park and Cotati.
(2) Persons per household at buildout is calculated based on the total household population and the occupied housing units.
(3) Occupied housing units is the total number of households.

Source: Association of Bay Area Governments, Projections '94; General Plans of all cities; Economic and Planning Systems, Inc.

California Department of Finance
Demographic Data

ATTACHMENT A

SONOMA COUNTY POPULATION AND JSING ESTIMATES
January 1, 1994

CA. DEPARTMENT OF FINAN.
DEMOGRAPHIC RESEARCH UNIT
PRINTED 04/28/94

CONTROLLED	POPULATION			HOUSING UNITS								PERSONS PER
					SINGLE		MULTIPLE					
CITY	TOTAL	HOUSE-HOLD	GROUP QUARTER	TOTAL	DETACHED	ATTACHED	2 TO 4	5 PLUS	MOBILE HOMES	OCCU-PIED	% VACANT	HOUSE-HOLD
CLOVERDALE	5484	5481	3	2201	1428	96	146	369	162	2024	8.04	2.708
COTATI	6502	6502	0	2647	1481	423	217	396	130	2544	3.89	2.556
HEALDSBURG	9799	9712	87	3832	2810	173	400	350	99	3672	4.18	2.645
PETALUMA	47066	46584	482	17811	12757	1302	993	1881	878	17296	2.89	2.693
ROHNERT PARK	39017	38359	658	14745	7001	1550	956	3772	1466	14198	3.71	2.702
SANTA ROSA	124913	123247	1666	51347	30104	4157	4396	10154	2536	49501	3.60	2.490
SEBASTOPOL	7501	7295	206	3113	1882	221	375	518	117	3015	3.15	2.420
SONOMA	8696	8471	225	4411	2248	538	489	649	487	4019	8.89	2.108
WINDSOR	17342	17241	101	6372	4900	251	120	301	800	5856	8.10	2.944
INCORPORATED	266320	262892	3428	106479	64611	8711	8092	18390	6675	102125	4.09	2.574
UNINCORPORATED	155770	151429	4341	64568	50985	2472	2772	3083	5256	57318	11.23	2.642
COUNTY TOTAL	422090	414321	7769	171047	115596	11183	10864	21473	11931	159443	6.78	2.599

CALIFORNIA DEPARTMENT OF FINANCE
DEMOGRAPHIC RESEARCH UNIT

REPORT E-5 PRELIM
PAGE 58

SONOMA COUNTY POPULATION AND HOUSING ESTIMATES
JANUARY 1, 1990

PRINTED
05/03/9

CONTROLLED	POPULATION			HOUSING UNITS*			PERSON PER
CITY	TOTAL	HOUSE-HOLD	GROUP QUARTER	TOTAL	OCCUPIED	PERCENT VACANT	HOUSE-HOLD
CLOVERDALE	4881	4873	8	2030	1865	8.13	2.613
COTATI	5624	5624	0	2355	2257	4.16	2.492
HEALDSBURG	9462	9386	76	3730	3635	2.55	2.582
PETALUMA	42819	42315	504	16493	15998	3.00	2.645
ROHNERT PARK	36057	35399	658	13893	13368	3.78	2.648
SANTA ROSA	112134	110474	1660	47519	45460	4.33	2.430
SEBASTOPOL	6943	6736	207	2928	2843	2.90	2.369
SONOMA	8018	7816	202	4144	3790	8.54	2.062
TOTAL INCORPORATED	225938	222623	3315	93092	89216	4.16	2.495
UNINCORPORATED	158715	154132	4583	67041	59095	11.85	2.608
COUNTY TOTAL	384653	376755	7898	160133	148311	7.38	2.540

* HOUSING UNITS BY TYPE FROM THE 1990 CENSUS HAVE NOT BEEN RELEASED.
WE EXPECT THEM TO BE AVAILABLE FOR THE 1992 E-5 REPORT

SONOMA COUNTY POPULATION AND HOUSING ESTIMATES
APRIL 1, 1980

CA. DEPARTMENT OF FINANCE
DEMOGRAPHIC RESEARCH UNIT
PRINTED 05/04/89

CONTROLLED

CITY	POPULATION TOTAL	POPULATION HOUSE-HOLD	POPULATION GROUP QUARTER	HOUSING UNITS TOTAL	SINGLE DETACHED	SINGLE ATTACHED	MULTI-FAMILY 2 TO 4	MULTI-FAMILY 5 PLUS	MOBILE HOMES	OCCU-PIED	% VACANT	PERSON PER HOUSE-HOLD
CLOVERDALE	3989	3919	70	1656	1182	18	89	229	138	1591	3.93	2.463
COTATI	3346	3340	6	1401	575	169	155	395	107	1339	4.43	2.494
HEALDSBURG	7217	7183	34	2985	2197	54	355	298	81	2885	3.35	2.490
PETALUMA	33834	33465	369	12540	9785	222	895	1008	630	12124	3.32	2.760
ROHNERT PARK	22965	22933	32	8761	4819	720	733	1384	1105	8291	5.36	2.766
SANTA ROSA	82658	81469	1189	34928	21744	2639	3243	5714	1588	33573	3.88	2.427
SEBASTOPOL	5595	5406	189	2466	1838	106	225	433	64	2358	4.38	2.293
SONOMA	6054	5850	204	2883	1885	257	277	381	323	2752	4.54	2.126
TOTAL INCORPORATED	165658	163565	2093	67620	43805	4185	5972	9822	4036	64913	4.00	2.520
UNINCORPORATED	134023	129827	4196	56569	42097	1488	4537	3938	4509	48563	12.38	2.618
COUNTY TOTAL	299681	293392	6289	124189	85702	5673	10509	13760	8545	114478	7.82	2.563

Exhibit A - Flow Factors Spread Sheets

Presented in this Exhibit are six spreadsheets used to determine the change over time of the Residential and CII wastewater flow factors. The changes are due to California's water conservation laws and implementation of the Member Entity water conservation programs. The spreadsheet is somewhat long and complex, and a brief explanation of the spreadsheet is presented to facilitate the reader's understanding of its contents.

4.4 SPREADSHEET EXPLANATION

The spreadsheet consists of 5 columns (A through E) and many rows. The column letters are printed at the top of the spreadsheet, and the row numbers are printed at the left of the spreadsheet. An example spreadsheet has been included with the spreadsheet formulas printed rather than the resulting numbers. Values entered as input to the spreadsheet are listed in column D, and values calculated as output by the spreadsheet are listed in column E. The column and row numbers printed in the formulas in the output column (E) refer to the column and rows at the top and left of the spreadsheet.

The **Bold Faced Entries** are section headings, or the results that conclude the section. For example, row 8, **Demographic Information** is a section heading; row 35, **Determine Quantities of Low Flow Shower Heads (LFSH) and Non-LFSH** is a section heading; and rows 40 (**1994 Total LFSH**), 41 (**1994 Total Non-LFSH**), 54, 55, 68, and 69 are the results which provide the "answer" to the "question" posed in the section heading.

The spreadsheet is discussed below by section.

4.4.1 Demographic Information (rows 8-23)

This information is from Table 4 the body of this technical memorandum. The values used and the source of the information are identified in Table 4.

4.4.2 Water Use and Water Conservation Information (rows 25-31)

The wastewater flow (row 26) is from Table 9.

The water savings by conservation fixture (rows 27-29) are based upon:

LFSH savings factors are 3.4 gpcd for the 1980 to 1992 era LFSH and 7.2 gpcd for the post 1992 era LFSH. For each Member Entity an average savings has been calculated based upon the housing age distribution, and a replacement rate of showerheads of 5 percent per year. In Santa Rosa for example, from 1980 through 1992, 13,742 DUs were constructed with 3.4 gpcd savings LFSH. During the 1980 to 1992 period, 60 percent (12 years at 5 percent per year) of the non-LFSH (pre-1980 housing of 33,575 DU) were replaced with 3.4 gpcd LFSHs. From 1992 through 1994 there were 2,191 DUs constructed with 7.2 gpcd savings LFSHs. Overall, the average LFSH savings for 1994 is about 3.6 gpcd (row 27). At buildout of the Santa Rosa General Plan (in the year 2010) 18 years will have elapsed, and thus 90 percent (18 years at 5 percent per year) of the 3.4 gpcd savings LFSH will have been replaced with 7.2 gpcd savings LFSH. Santa Rosa has a LFSH retrofit program which will likely result in the replacement of

the remaining 10 percent of the 3.4 gpcd savings LFSHs. Thus at buildout, all of the LFSHs will be of the 7.2 gpcd savings type (row 28).

Savings of 14.7 percent per DU for use of ULFTs have been converted to per capita savings factors for each of the Member Entities. For example, for Santa Rosa the per DU flow (in 1994) was 192.0 gal/day/DU; a savings of 14.7 percent is 28.22 gal/day/DU. In 1994 the housing density was 2.49 capita per DU, and thus the per capita savings factor is 11.3 gpcd. Similarly, a 10.8 percent savings for use of 3.5 gpf toilets results in a savings factor of 8.3 gpcd.

The water meter savings factors (row 31) is estimated to be 1 percent. Water meters and commodity pricing in and of themselves do not reduce water use. They do, however, provide water users an incentive to install LFSH and LFT which result in decreased water use. Additionally, water meters result in changing peoples behavior which results in reduction of water use. (For example, encouraging people to not leave the water running while washing a car or brushing their teeth). A one percent reduction in wastewater flow has been assumed (in addition to the reduction from conservation fixtures) as a result of installing water meters.

4.4.3 Determine Number of DUs with Low Flow Shower Heads (LFSH) and Non-LFSH (row 33)

The 1994 LFSH "penetration" means the fraction of DUs which have LFSHs (row 34) from natural replacement. The value of 0.60 is from Bill Maddaus' response to comments (dated April 28, 1994) about the Montgomery Watson Water Use Study, Technical Memorandum No. 1 and is used for all the Member Entities.

The 1994 Number of DUs with Non-LFSH Replaced Due to Retrofit Program (row 36) is from information provided by the Member Entities. For example, since April 1992 Santa Rosa has distributed about 10,000 LFSHs, at about 1.5 showers per DU, this equates to about 6,667 DUs with LFSH.

The 1994 to Buildout Annual LFSH Penetration Rate (row 42) is the fraction of 1994 LFSHs that are replaced annually through natural replacement. The value of 0.05 is from Bill Maddaus' response to comments (dated April 28, 1994) about the Montgomery Watson Water Use Study, Technical Memorandum No. 1, and is used for all the Member Entities except Rohnert Park. In Rohnert Park single family DUs constructed before January 1992 are unmetered. Because these DUs are unmetered, there is less incentive for the residents to replace nonLFSH. A value of 0.04 has been used for the unmetered connections, and a weighted average of metered and unmetered connections was calculated to be 0.044.

The 1994 to Buildout Fraction of Natural Replacement Replaced Through the Retrofit Program (row 44) is to ensure that no replacements are counted twice (as natural replacements and retrofit program replacements).

The 1994 to Buildout DUs with LFSH Replacement Rate Due to Retrofit Program (row 46) is the quantity of fixtures replaced annually through the retrofit program. The value is estimated from information provided by the Member Entities. For example, through Santa Rosa's retrofit program, 19,800 DUs are expected to be retrofit in 5 years, which would be 3,960 DUs per year.

However, because the spreadsheet only considers the present time (1994) and buildout (2010), the annual rate would be 1,237 DU per year (19,800 DU/16 years). Additionally, about 65 percent of the DUs retrofit with toilets already have LFSH, so the value was reduced by 65 percent to 433 DUs per year.

The 1994 to Buildout DUs with LFSH added Through New Construction (row 50) is the quantity of new DUs projected to be built between 1994 and buildout.

The Buildout Total LFSH and Total Non-LFSH (rows 52 and 53) are the 1994 values plus the quantities replaced and new fixtures added. The "IF" statement ensures that the non-conservation fixtures replaced value is not more than the total 1994 non-conservation fixtures.

4.4.4 Determine Number of 5.5 GPF, 3.5 GPF, and ULFT (row 56)

The toilets are handled similarly to the LFSHs except there are three types of toilets to track.

The 1994 toilet penetration and natural replacement rates are from Bill Maddaus' response to comments (dated April 28, 1994) about the Montgomery Watson Water Use Study, Technical Memorandum No. 1. The penetration of LFT was estimated based upon a natural replacement rate of 3 percent per year. The resulting toilet distribution is:

5.5 gpf toilets	Pre 1980	55 percent penetration
	1980 to 1993	0 percent penetration
	Post 1993	0 percent penetration
3.5 gpf toilets	Pre 1980	40 percent penetration
	1980 to 1993	90 percent penetration
	Post 1993	0 percent penetration
1.6 gpf toilets	Pre 1980	5 percent penetration
	1980 to 1993	10 percent penetration
	Post 1993	100 percent penetration

These values have been used for all the Member Entities except Sebastopol, because Sebastopol negotiated with developers to use ULFT in 1990. Therefore, the 3.5 gpf, 1980 to 1993 value was decreased to 0.80, and the 1.6 gpf, 1980 to 1993 value was increased to 20 percent. The 3 percent per year replacement rate is used for all Member Entities (row 85) except Rohnert Park. In Rohnert Park single family DUs constructed before January 1992 are unmetered. Because these DUs are unmetered, there is less incentive for the residents to replace non-low flow toilets. A value of 0.025 has been used for the unmetered connections, and a weighted average of metered and unmetered connections was calculated to be 0.027.

The 1994 to Buildout Fraction of Natural Replacement Replaced Through the Retrofit Program (row 91) is to ensure that no replacements are counted twice (as natural replacements and retrofit program replacements).

Retrofit Program information is based upon information provided by the Member Entities. Santa Rosa, for example, replaced about 1,670 toilets in the pilot retrofit program. At 1.5 toilets per DU, this represents 1,113 DUs retrofit with ULFTs (row 66). Again, through Santa Rosa's retrofit program, 19,800 DUs are expected to be retrofit in 5 years, which would be 3,960 DUs per year. If one-third of the toilets replaced are in CII buildings, then 13,200 toilets will be replaced in homes. Because the spreadsheet only considers the present time (1994) and buildout (2010), the annual rate has been adjusted to 825 DUs per year (13,200 DU/16 years).

4.4.5 Determine Existing and Expected Wastewater Flow Reduction From LFSH and 3.5 GPF Toilets and ULFT (row 127)

These water savings are based upon the toilet and LFSH fixture totals determined above, and the demographic and water conservation information presented above.

4.4.6 Determine 1994 Water Meter Water Savings (row 162)

These are estimates of the water savings due to water meters (rows 163 to 165)

4.4.7 Determine the 1994 Wastewater Flow and Flow Factor Without Water Conservation Programs (row 167)

This is the actual wastewater flow in 1994 plus the calculated 1994 water savings (row 173), and the without conservation flow factor (row 175).

4.4.8 Determine the Buildout Wastewater Flow and Flow Factor With Water Conservation (row 182)

The Buildout with conservation flow (row 190) is calculated as the 1994 without conservation flow minus the conservation flow reductions.

The Buildout With Water Conservation Flow Factor (row 192) is the with conservation flow divided by the buildout total DUs.

Example Spreadsheet

A	B	C	D	E
			Input	Output
5		**City**	**Santa Rosa Plus SPCSD**	
6		**Wastewater Type**	**Residential**	
7				
8		**Demographic Information**		
9		Year/Quantity of DU		
10		1980	33573	
11		1990	45460	
12		1992 (interpolation between 1990 and 1994)		=D11+((E14-D11)*0.4)
13		Unsewered DUs that will be sewered by Buildout	390	
14		1994 and 1994 minus unsewered	49501	=D14-D13
15		Buildout	72900	
16		Growth of DU Per Period		
17		Pre 1980		=D10
18		1980-1992		=E12-D10
19		1992-1994		=E14-E12
20		1994-Buildout		=D15-E14
21				
22		1994 Density (capita/DU)	2.49	
23		Buildout Density (capita/DU)	2.39	
24				
25		**Water Use and Water Conservation Information**		
26		1994 Wastewater Flow Rate (mgd, gal/day)	9.43	=D26*1000000
27		1994 Average Low Flow Shower Head savings (gpcd)	3.6	
28		Buildout Average Low Flow Shower Head Savings (gpcd)	7.2	
29		3.5 Gallon Per Flush Toilet Water Savings (gal/capita/day) (3.5 GPF Versus 5.5 GPF)	8.3	
30		Ultra Low Flow Toilet Savings (gal/capita/day) (1.6 GPF Versus 5.5 GPF)	11.3	
31		Water Meter Savings Factor (without meters factor = 0.00, with meters factor > 0.00)	0.01	
32				
33		**Determine Number of DUs with Low Flow Shower Heads (LFSH) By Type**		
34		1994 LFSH Penetration Due to Natural Replacemnent (fraction of DUs)	0.6	
35		1994 Quantity of DUs with LFSH Due to Natural Replacement (number of DUs)		=D34*E14
36		1994 Number of DUs with Non-LFSH Replaced Due to Retrofit Program (number of DUs)	6667	
37				
38		**1994 Total DUs with LFSH (number of DUs)**		**=E35+D36**
39		**1994 Total Non-LFSH (number of DUs)**		**=E14-E38**
40				
41		1994 to Buildout Years Elapsed (years elapsed)	16	
42		1994 to Buildout Annual LFSH Penetration Rate from Natural Replacement (fraction per year)	0.05	
43		1994 to Buildout LFSH Replacement Rate Due To Natural Replacement (DUs/yr)		=D42*E39

44		1994 to Buildout Fraction of Natural Replacement Replaced Through Retrofit Program	0.1	
45		1994 to Buildout DUs with LFSH Replaced through Natural Replacement (DUs/yr)		=E43*(1-D44)
46		1994 to Buildout DUs with LFSH Replacement Rate Due to Retrofit Program (DUs/yr)	433	
47		1994 to Buildout DUs with LFSH Replacement Rate (DUs/yr)		=D46+E45
48		1994 to Buildout Total DUs with LFSH Replaced (number of DUs)		=E47*D41
49				
50		1994 to Buildout DUs added to System through New Construction		=E20
51				
52		**Buildout Total LFSH**		**=IF(E48>E39,E38+E39+E50,E38+E48+E50**
53		**Buildout Total Non-LFSH**		**=IF(E48>E39,0,E39-E48)**
54				
55				
56		**Determine Numbers of DUs with 5.5 Gallon Per Flush (GPF), 3.5 GPF, and Ultra Low Flow Toilet**		
57				
58		1994 - Toilet Penetration Due to Natural Replacement (fraction, number of DUs)		
59		5.5 GPF (Pre-1980)	0.55	=D59*E17
60		3.5 GPF (Pre-1980)	0.4	=D60*E17
61		3.5 GPF (1980-1992)	0.9	=D61*E18
62		ULFT (Pre-1980)	0.05	=D62*E17
63		1.6 ULFT (1980-1992)	0.1	=D63*E18
64		1.6 ULFT (1992-1994)	1	=D64*E19
65				
66		1994 DUs with Replacement of 5.5 GPF and 3.5 GPF toilets With 1.6 GPS Due to Retrofit Program	1113	
67		5.5 GPF (Pre-1980)		=D66*(E59/(E59+E60+E61))
68		3.5 GPF (Pre-1980)		=D66*(E60/(E59+E60+E61))
69		3.5 GPF (1980-1992)		=D66*(E61/(E59+E60+E61))
70				
71		1994 Toilet Distribution (number of DUs)		
72		5.5 GPF (Pre-1980)		=E59-E67
73		3.5 GPF (Pre-1980)		=E60-E68
74		3.5 GPF (1980-1992)		=E61-E69
75		ULFT (Pre-1980)		=E62+E67
76		1.6 ULFT (1980-1992)		=E63+E68
77		1.6 ULFT (1992-1994)		=E64+E69
78				
79		**1994 Total DUs with Each Toilet Type**		
80		**5.5 GPF**		**=E72**
81		**3.5 GPF**		**=E73+E74**
82		**ULFT**		**=E75+E76+E77**
83				
84		1994 to Buildout Years Elapsed (years)	16	
85		1994 to Buildout Natural Replacement Penetration Rate (fraction per year)	0.03	

86		1994 to Buildout Natural Replacement Rates (DUs per year)		
87		5.5 GPF (Pre-1980)		=D85*E72
88		3.5 GPF (Pre-1980)		=D85*E73
89		3.5 GPF (1980-1992)		=D85*E74
90				
91		1994 to Buildout Fraction of Natural Replacement Replaced Through Retrofit Program (fraction)	0.2	
92		1994 to Buildout Natural Replacement Rates (DUs per year)		
93		5.5 GPF (Pre-1980)		=(1-D91)*E87
94		3.5 GPF (Pre-1980)		=(1-D91)*E88
95		3.5 GPF (1980-1992)		=(1-D91)*E89
96				
97		1994 to Buildout Replacement Rate Through Retrofit Program (DUs per year)	825	
98		5.5 GPF (Pre-1980)		=D97*(E72/(E72+E73+E74))
99		3.5 GPF (Pre-1980)		=D97*(E73/(E72+E73+E74))
100		3.5 GPF (1980-1992)		=D97*(E74/(E72+E73+E74))
101				
102		1994 to Buildout Total Replacememnt Rate (DUs per year)		
103		5.5 GPF (Pre-1980)		=E93+E98
104		3.5 GPF (Pre-1980)		=E94+E99
105		3.5 GPF (1980-1992)		=E95+E100
106				
107		1994 to Buildout Total Toilet Replacements (number of DUs)		
108		5.5 GPF (Pre-1980)		=E103*D84
109		3.5 GPF (Pre-1980)		=E104*D84
110		3.5 GPF (1980-1992)		=E105*D84
111				
112		Buildout Toilet Distribution (number of DUs)		
113		5.5 GPF (Pre-1980)		=IF(E72>E108,E72-E108,0)
114		3.5 GPF (Pre-1980)		=IF(E73>E109,E73-E109,0)
115		3.5 GPF (1980-1992)		=IF(E74>E110,E74-E110,0)
116		ULFT (Pre-1980)		=IF(E72>E108,E75+E108,E75+E72)
117		ULFT (1980-1992)		=IF(E73>E109,E76+E109,E76+E73)
118		ULFT (1992-1994)		=IF(E74>E110,E77+E110,E77+E74)
119		1994 to Buildout DUs with New ULFT added Through New Construction (number of DUs)		=E20
120				
121		**Buildout Toilet Distribution (number of DUs)**		
122		**5.5 GPF**		**=E113**
123		**3.5 GPF**		**=E114+E115**
124		**ULFT**		**=E116+E117+E118+E119**
125				
126				
127		**Determine Existing and Expected Wastewater Flow Reduction From LFSH, 3.5 GPF Toilets, and**		

128				
129		1994 Capita per DU		=D22
130		1994 LFSH Water Savings (gal/capita/day)		=D27
131		1994 LFSH Wastewater Flow Reduction per DU (gal/day/DU)		=E130*E129
132		1994 Total DUs with LFSH (number of DUs)		=E38
133		**1994 Existing Total Wastewater Flow Recution from LFSH (gal/day)**		**=E131*E132**
134		1994 - 3.5 GPF Toilet Water Savings (gal/capita/day)		=D29
135		1994 -3.5 GPF Toilet Wastewater Flow Reduction per DU (gal/day/DU)		=E129*E134
136		1994 Total DUs with 3.5 GPF Toilets (number of DUs)		=E81
137		**1994 Existing Total Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)**		**=E136*E135**
138		1994 - ULFT Water Savings (gal/capita/day)		=D30
139		1994 ULFT Water savings (gal/DU/day)		=E138*E129
140		1994 DUs with ULFT (number of DUs)		=E82
141		**1994 Existing Total Wastewater Flow Reduction from ULFT (gal/day)**		**=E140*E139**
142				
143		**Total 1994 Wastewater Flow Reduction (gal/day)**		**=E133+E137+E141**
144				
145		Buildout Capita per DU		=D23
146		Buildout LFSH Water Savings (gal/capita/day)		=D28
147		Buildout LFSH Wastewater Flow Reduction per DU (gal/du/day)		=E146*E145
148		Buildout Total DUs with LFSH (number of DUs)		=E52
149		**Buildout Expected Total Wastewater Flow Reduction from LFSH (gal/day)**		**=E147*E148**
150		Buildout - 3.5 GPF Toilet Water Savings (gal/capita/day)		=D29
151		Buildout -3.5 GPF Toilet Wastewater Flow Reduction per DU (gal/DU/day)		=E145*E150
152		Buildout Total DUs with 3.5 GPF Toilets		=E123
153		**Buildout Expected Total Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)**		**=E152*E151**
154		Buildout - ULFT Water Savings (gal/capita/day)		=D30
155		Buildout ULFT Water savings (gal/DU/day)		=E154*E145
156		Buildout Total DUs with ULFT		=E124
157		**Buildout Expected Total Wastewater Flow Reduction from ULFT (gal/day)**		**=E156*E155**
158				
159		**Total Buildout Wastewater Flow Reduction (gal/day)**		**=E149+E153+E157**
160				
161				
162		**Determine 1994 Water Meter Program Water Savings**		
163		1994 Actual Measured Wastewater Flow (gal/day)		=E26
164		1994 Water Meter Factor		=D31
165		**1994 Water Meter Wastewater Flow Reduction (gal/day)**		**=E163*E164**
166				
167		**Determine 1994 Wastewater Flow and Flow Factor Without Water Conservation Programs**		
168		1994 Actual Measured Water Use (gal/day)		=E26
169		1994 Wastewater Flow Reduction from LFSH (gal/day)		=E133

170	1994 Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)		=E137
171	1994 Wastewater Flow Reduction from ULFT (gal/day)		=E141
172	1994 Water Meter Wastewater Flow Reduction (gal/day)		=E165
173	**1994 Wastewater Flow Without Water Conservation Programs (gal/day)**		**=E168+E169+E170+E171+E172**
174	1994 Total DUs		=E14
175	**1994 Without Water Conservation Flow Factor (gal/day/DU)**		**=E173/E174**
176			
177	**Determine 1994 Wastewater Flow and Flow Factor With Water Conservation Programs**		
178	**1994 Actual Measured Wastewater Flow (gal/day)**		**=E26**
179	1994 Total DUs		=E14
180	**1994 With Water Conservation Flow Factor (gal/day/DU)**		**=E178/E179**
181			
182	**Determine Buildout Wastewater Flow and Flow Factor With Water Conservation Programs**		
183	Without Conservation Flow Factor (gal/day)		=E175
184	Buildout Total DUs		=D15
185	Buildout Total Without Conservation Wastewater Flow (gal/day)		=E184*E183
186	Buildout Wastewater Flow Reduction from LFSH (gal/day)		=E149
187	Buildout Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)		=E153
188	Buildout Wastewater Flow Reduction from ULFT (gal/day)		=E157
189	Buildout Water Meter Wastewater Flow Reduction (gal/day)		=D31*E185
190	**Buildout Wastewater Flow With Water Conservation Programs (gal/day)**		**=E185-E186-E187-E188-E189**
191	Buildout Total DUs		=D15
192	**Buildout With Water Conservation Flow Factor (gal/day/DU)**		**=E190/E191**

Santa Rosa
Residential

A	B	C	D	E
			Input	Output
5		**City**	**Santa Rosa Plus SPCSD**	
6		**Wastewater Type**	**Residential**	
7				
8		**Demographic Information**		
9		Year/Quantity of DU		
10		1980	33,573	
11		1990	45,460	
12		1992 (interpolation between 1990 and 1994)		47,076
13		Unsewered DUs that will be sewered by Buildout	0	
14		1994 and 1994 minus unsewered	49,501	49,501
15		Buildout	72,900	
16		Growth of DU Per Period		
17		Pre 1980		33,573
18		1980-1992		13,503
19		1992-1994		2,425
20		1994-Buildout		23,399
21				
22		1994 Density (capita/DU)	2.49	
23		Buildout Density (capita/DU)	2.39	
24				
25		**Water Use and Water Conservation Information**		
26		1994 Wastewater Flow Rate (mgd, gal/day)	9.52	9,520,000
27		1994 Average Low Flow Shower Head savings (gpcd)	3.60	
28		Buildout Average Low Flow Shower Head Savings (gpcd)	7.20	
29		3.5 Gallon Per Flush Toilet Water Savings (gal/capita/day) (3.5 GPF Versus 5.5 GPF)	8.30	
30		Ultra Low Flow Toilet Savings (gal/capita/day) (1.6 GPF Versus 5.5 GPF)	11.30	
31		Water Meter Savings Factor (without meters factor = 0.00, with meters factor > 0.00)	0.01	
32				
33		**Determine Number of DUs with Low Flow Shower Heads (LFSH) By Type**		
34		1994 LFSH Penetration Due to Natural Replacemnent (fraction of DUs)	0.60	
35		1994 Quantity of DUs with LFSH Due to Natural Replacement (number of DUs)		29,701
36		1994 Number of DUs with Non-LFSH Replaced Due to Retrofit Program (number of DUs)	6,667	
37				
38		**1994 Total DUs with LFSH (number of DUs)**		**36,368**
39		**1994 Total Non-LFSH (number of DUs)**		**13,133**
40				
41		1994 to Buildout Years Elapsed (years elapsed)	16	
42		1994 to Buildout Annual LFSH Penetration Rate from Natural Replacement (fraction per year)	0.05	
43		1994 to Buildout LFSH Replacement Rate Due To Natural Replacement (DUs/yr)		657
44		1994 to Buildout Fraction of Natural Replacement Replaced Through Retrofit Program	0.10	
45		1994 to Buildout DUs with LFSH Replaced through Natural Replacement (DUs/yr)		591
46		1994 to Buildout DUs with LFSH Replacement Rate Due to Retrofit Program (DUs/yr)	433	
47		1994 to Buildout DUs with LFSH Replacement Rate (DUs/yr)		1,024
48		1994 to Buildout Total DUs with LFSH Replaced (number of DUs)		16,384
49				
50		1994 to Buildout DUs added to System through New Construction		23,399
51				
52		**Buildout Total LFSH**		**72,900**
53		**Buildout Total Non-LFSH**		**0**
54				
55				
56		**Determine Numbers of DUs with 5.5 Gallon Per Flush (GPF), 3.5 GPF, and Ultra Low Flow Toilet (ULFT, 1.6 GPF) Toilets**		
57				

58		1994 - Toilet Penetration Due to Natural Replacement (fraction, number of DUs)		
59		5.5 GPF (Pre-1980)	0.55	18,465
60		3.5 GPF (Pre-1980)	0.40	13,429
61		3.5 GPF (1980-1992)	0.90	12,153
62		ULFT (Pre-1980)	0.05	1,679
63		1.6 ULFT (1980-1992)	0.10	1,350
64		1.6 ULFT (1992-1994)	1.00	2,425
65				
66		1994 DUs with Replacement of 5.5 GPF and 3.5 GPF toilets With 1.6 GPS Due to Retrofit Program	1,113	
67		5.5 GPF (Pre-1980)		467
68		3.5 GPF (Pre-1980)		339
69		3.5 GPF (1980-1992)		307
70				
71		1994 Toilet Distribution (number of DUs)		
72		5.5 GPF (Pre-1980)		17,999
73		3.5 GPF (Pre-1980)		13,090
74		3.5 GPF (1980-1992)		11,846
75		ULFT (Pre-1980)		2,145
76		1.6 ULFT (1980-1992)		1,690
77		1.6 ULFT (1992-1994)		2,732
78				
79	**1994 Total DUs with Each Toilet Type**			
80		**5.5 GPF**		**17,999**
81		**3.5 GPF**		**24,936**
82		**ULFT**		**6,567**
83				
84		1994 to Buildout Years Elapsed (years)	16.00	
85		1994 to Buildout Natural Replacement Penetration Rate (fraction per year)	0.03	
86		1994 to Buildout Natural Replacement Rates (DUs per year)		
87		5.5 GPF (Pre-1980)		540
88		3.5 GPF (Pre-1980)		393
89		3.5 GPF (1980-1992)		355
90				
91		1994 to Buildout Fraction of Natural Replacement Replaced Through Retrofit Program (fraction)	0.20	
92		1994 to Buildout Natural Replacement Rates (DUs per year)		
93		5.5 GPF (Pre-1980)		432
94		3.5 GPF (Pre-1980)		314
95		3.5 GPF (1980-1992)		284
96				
97		1994 to Buildout Replacement Rate Through Retrofit Program (DUs per year)	825	
98		5.5 GPF (Pre-1980)		346
99		3.5 GPF (Pre-1980)		252
100		3.5 GPF (1980-1992)		228
101				
102		1994 to Buildout Total Replacememnt Rate (DUs per year)		
103		5.5 GPF (Pre-1980)		778
104		3.5 GPF (Pre-1980)		566
105		3.5 GPF (1980-1992)		512
106				
107		1994 to Buildout Total Toilet Replacements (number of DUs)		
108		5.5 GPF (Pre-1980)		12,445
109		3.5 GPF (Pre-1980)		9,051
110		3.5 GPF (1980-1992)		8,191
111				
112		Buildout Toilet Distribution (number of DUs)		
113		5.5 GPF (Pre-1980)		5,554

114	3.5 GPF (Pre-1980)		4,039
115	3.5 GPF (1980-1992)		3,655
116	ULFT (Pre-1980)		14,590
117	ULFT (1980-1992)		10,741
118	ULFT (1992-1994)		10,923
119	1994 to Buildout DUs with New ULFT added Through New Construction (number of DUs)		23,399
120			
121	**Buildout Toilet Distribution (number of DUs)**		
122	**5.5 GPF**		**5,554**
123	**3.5 GPF**		**7,694**
124	**ULFT**		**59,652**
125			
126			
127	**Determine Existing and Expected Wastewater Flow Reduction From LFSH, 3.5 GPF Toilets, and ULFT**		
128			
129	1994 Capita per DU		2.49
130	1994 LFSH Water Savings (gal/capita/day)		3.60
131	1994 LFSH Wastewater Flow Reduction per DU (gal/day/DU)		8.96
132	1994 Total DUs with LFSH (number of DUs)		36,368
133	**1994 Existing Total Wastewater Flow Recution from LFSH (gal/day)**		**325,999**
134	1994 - 3.5 GPF Toilet Water Savings (gal/capita/day)		8.30
135	1994 -3.5 GPF Toilet Wastewater Flow Reduction per DU (gal/day/DU)		20.67
136	1994 Total DUs with 3.5 GPF Toilets (number of DUs)		24,936
137	**1994 Existing Total Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)**		**515,349**
138	1994 - ULFT Water Savings (gal/capita/day)		11.30
139	1994 ULFT Water savings (gal/DU/day)		28.14
140	1994 DUs with ULFT (number of DUs)		6,567
141	**1994 Existing Total Wastewater Flow Reduction from ULFT (gal/day)**		**184,764**
142			
143	**Total 1994 Wastewater Flow Reduction (gal/day)**		**1,026,112**
144			
145	Buildout Capita per DU		2.39
146	Buildout LFSH Water Savings (gal/capita/day)		7.20
147	Buildout LFSH Wastewater Flow Reduction per DU (gal/du/day)		17.21
148	Buildout Total DUs with LFSH (number of DUs)		72,900
149	**Buildout Expected Total Wastewater Flow Reduction from LFSH (gal/day)**		**1,254,463**
150	Buildout - 3.5 GPF Toilet Water Savings (gal/capita/day)		8.30
151	Buildout -3.5 GPF Toilet Wastewater Flow Reduction per DU (gal/DU/day)		19.84
152	Buildout Total DUs with 3.5 GPF Toilets		7,694
153	**Buildout Expected Total Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)**		**152,627**
154	Buildout - ULFT Water Savings (gal/capita/day)		11.30
155	Buildout ULFT Water savings (gal/DU/day)		27.01
156	Buildout Total DUs with ULFT		59,652
157	**Buildout Expected Total Wastewater Flow Reduction from ULFT (gal/day)**		**1,611,032**
158			
159	**Total Buildout Wastewater Flow Reduction (gal/day)**		**3,018,123**
160			
161			
162	**Determine 1994 Water Meter Program Water Savings**		
163	1994 Actual Measured Wastewater Flow (gal/day)		9,520,000
164	1994 Water Meter Factor		0.01
165	**1994 Water Meter Wastewater Flow Reduction (gal/day)**		**95,200**
166			
167	**Determine 1994 Wastewater Flow and Flow Factor Without Water Conservation Programs**		
168	1994 Actual Measured Water Use (gal/day)		9,520,000
169	1994 Wastewater Flow Reduction from LFSH (gal/day)		325,999

170	1994 Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)		515,349
171	1994 Wastewater Flow Reduction from ULFT (gal/day)		184,764
172	1994 Water Meter Wastewater Flow Reduction (gal/day)		95,200
173	**1994 Wastewater Flow Without Water Conservation Programs (gal/day)**		**10,641,312**
174	1994 Total DUs		49,501
175	**1994 Without Water Conservation Flow Factor (gal/day/DU)**		**215.0**
176			
177	**Determine 1994 Wastewater Flow and Flow Factor With Water Conservation Programs**		
178	**1994 Actual Measured Wastewater Flow (gal/day)**		**9,520,000**
179	1994 Total DUs		49,501
180	**1994 With Water Conservation Flow Factor (gal/day/DU)**		**192.3**
181			
182	**Determine Buildout Wastewater Flow and Flow Factor With Water Conservation Programs**		
183	Without Conservation Flow Factor (gal/day)		215.0
184	Buildout Total DUs		72,900
185	Buildout Total Without Conservation Wastewater Flow (gal/day)		15,671,434
186	Buildout Wastewater Flow Reduction from LFSH (gal/day)		1,254,463
187	Buildout Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)		152,627
188	Buildout Wastewater Flow Reduction from ULFT (gal/day)		1,611,032
189	Buildout Water Meter Wastewater Flow Reduction (gal/day)		156,714
190	**Buildout Wastewater Flow With Water Conservation Programs (gal/day)**		**12,496,597**
191	Buildout Total DUs		72,900
192	**Buildout With Water Conservation Flow Factor (gal/day/DU)**		**171.4**

Santa Rosa and SPCSD
Commercial, Industrial, Institutional

A	B	C	D	E
			Input	Output
5		**City**	**Santa Rosa Plus SPCSD**	
6		**Wastewater Type**	**CII**	
7				
8		**Demographic Information**		
9		Year/Number of Employees		
10		1980	55,926	
11		1990	74,711	
12		1992 (interpolation between 1990 and 1994)		76,613
13		Unsewered DUs that will be Sewered by Buildout	0	
14		1994 and 1994 minus unsewered	79,467	79,467
15		Buildout	98,500	
16		Increase of Employees Per Period		
17		Pre 1980		55,926
18		1980-1992		20,687
19		1992-1994		2,854
20		1994-Buildout		19,033
21				
22				
23		**Water Use and Water Conservation Information**		
24		Showers/Day/Employee	0.00	
25		Flushes/Day/Employee	2.00	
26		1994 Wastewater Flow Rate (mgd, gal/day)	3.22	3,220,000
27		Low Flow Shower Head Water Savings (gal/shower/day) (Pre-1992 to Post-1992)	7.20	
28		3.5 Gallon Per Flush Toilet Water Savings (GPF) (3.5 GPF Versus 5.5 GPF)	2.00	
29		Ultra Low Flow Toilet Savings (GPF) (1.6 GPF Versus 5.5 GPF)	3.90	
30		Water Meter Savings Factor (without meters factor = 0.00, with meters factor > 0.00)	0.010	
31				
32		**Determine Number of Employees Using Low Flow Shower Heads (LFSH) and Non-LFSH**		
33		1994 LFSH Penetration Due to Natural Replacemnent (fraction of employees)	0.60	
34		1994 Employees Using LFSH Due to Natural Replacement (number of employees)		47,680
35		1994 Employees Using Non-LFSH Replaced Due to Retrofit Program (number of employees)	0	
36				
37		**1994 Total Employees Using LFSH (number of employees)**		**47,680**
38		**1994 Total Employees Using Non-LFSH (number of employees)**		**31,787**
39				
40		1994 to Buildout Years Elapsed (years elapsed)	16	
41		1994 to Buildout Annual LFSH Penetration Rate from Natural Replacement (fraction per year)	0.05	
42		1994 to Buildout LFSH Replacement Rate Due To Natural Replacement (employees/yr)		1,589
43		1994 to Buildout Fraction of Natural Replacement Replaced Through Retrofit Program	0.20	
44		1994 to Buildout Employees using LFSH Replaced through Natural Replacement (employees/yr)		1,271
45		1994 to Buildout Employees Using LFSH Replacement Rate Due to Retrofit Program (employees/yr)	0	
46		1994 to Buildout Employees Using LFSH Replacement Rate (Employees/yr)		1,271
47		1994 to Buildout Total Employees Using LFSH Replaced (number of employees)		20,344
48				
49		1994 to Buildout Employees Using LFSH added Through New Construction		19,033
50				
51		**Buildout Total Employees Using LFSH**		**87,057**
52		**Buildout Total Employees UsingNon-LFSH**		**11,443**
53				
54				
55		**Determine Numbers of Employees Using 5.5 Gallon Per Flush (GPF), 3.5 GPF, and Ultra Low Flow Toilet (ULFT, 1.6 GPF) T**		
56				
57		1994 - Toilet Penetration Due to Natural Replacement (fraction, number of employees)		

58		5.5 GPF (Pre-1980)	0.55	30,759
59		3.5 GPF (Pre-1980)	0.40	22,370
60		3.5 GPF (1980-1992)	0.90	18,619
61		ULFT (Pre-1980)	0.05	2,796
62		1.6 ULFT (1980-1992)	0.10	2,069
63		1.6 ULFT (1992-1994)	1.00	2,854
64				
65		1994 Number of Employees Using 5.5 GPF and 3.5 GPF toilets With 1.6 GPS Due to Retrofit Progra	0	
66		5.5 GPF (Pre-1980)		0
67		3.5 GPF (Pre-1980)		0
68		3.5 GPF (1980-1992)		0
69				
70		1994 Employee-Toilet Use Distribution (number of employeess)		
71		5.5 GPF (Pre-1980)		30,759
72		3.5 GPF (Pre-1980)		22,370
73		3.5 GPF (1980-1992)		18,619
74		ULFT (Pre-1980)		2,796
75		1.6 ULFT (1980-1992)		2,069
76		1.6 ULFT (1992-1994)		2,854
77				
78	**1994 Total Employees Using Each Toilet Type**			
79		**5.5 GPF**		**30,759**
80		**3.5 GPF**		**40,989**
81		**ULFT**		**7,719**
82				
83		1994 to Buildout Years Elapsed (years)	16	
84		1994 to Buildout Natural Replacement Penetration Rate (fraction per year)	0.03	
85		1994 to Buildout Natural Replacement Rates (employees per year)		
86		5.5 GPF (Pre-1980)		923
87		3.5 GPF (Pre-1980)		671
88		3.5 GPF (1980-1992)		559
89				
90		1994 to Buildout Fraction of Natural Replacement Replaced Through Retrofit Program (fraction)	0.20	
91		1994 to Buildout Natural Replacement Rates (employees per year)		
92		5.5 GPF (Pre-1980)		738
93		3.5 GPF (Pre-1980)		537
94		3.5 GPF (1980-1992)		447
95				
96		1994 to Buildout Replacement Rate Through Retrofit Program (toilets per year)	413	
97		Ratio of Employees to Toilets	10	
98		1994 to Buildout Replacement Rate Through Retrofit Program (employees per year)	4,130	
99		5.5 GPF (Pre-1980)		1,771
100		3.5 GPF (Pre-1980)		1,288
101		3.5 GPF (1980-1992)		1,072
102				
103		1994 to Buildout Total Replacememnt Rate (employees per year)		
104		5.5 GPF (Pre-1980)		2,509
105		3.5 GPF (Pre-1980)		1,825
106		3.5 GPF (1980-1992)		1,519
107				
108		1994 to Buildout Total Toilet Replacements (number of employees)		
109		5.5 GPF (Pre-1980)		40,141
110		3.5 GPF (Pre-1980)		29,193
111		3.5 GPF (1980-1992)		24,297
112				
113		Buildout Employee Use Toilet Distribution (number of employees)		

114		5.5 GPF (Pre-1980)		0
115		3.5 GPF (Pre-1980)		0
116		3.5 GPF (1980-1992)		0
117		ULFT (Pre-1980)		33,556
118		ULFT (1980-1992)		24,439
119		ULFT (1992-1994)		21,472
120	1994 to Buildout Employees Using New ULFT added Through New Construction (number of employees)			19,033
121				
122	**Buildout Employee Toilet Use Distribution (number of employees)**			
123		**5.5 GPF**		**0**
124		**3.5 GPF**		**0**
125		**ULFT**		**98,500**
126				
127				
128	**Determine Existing and Expected Wastewater Flow Reduction From LFSH, 3.5 GPF Toilets, and ULFT**			
129				
130		Showers/Day/Employee		0.00
131		Low Flow Shower Head Water Savings (gal/shower/day) (Pre-1992 to Post-1992)		7.20
132		1994 LFSH Wastewater Flow Reduction per Employee (gal/employee/day)		0.00
133		1994 Total Employees Using LFSH (number of DUs)		47,680
134		**1994 Existing Total Wastewater Flow Reduction from LFSH (gal/day)**		**0**
135		Flushes/Day/Employee		2.0
136		3.5 Gallon Per Flush Toilet Water Savings (GPF) (3.5 GPF Versus 5.5 GPF)		2.00
137		1994 -3.5 GPF Toilet Wastewater Flow Reduction per Employee (gal/employee/day)		4.00
138		1994 Total Employees Using 3.5 GPF Toilets (number of employees)		40,989
139		**1994 Existing Total Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)**		**163,956**
140		Flushes/Day/Employee		2
141		Ultra Low Flow Toilet Savings (GPF) (1.6 GPF Versus 5.5 GPF)		3.90
142		1994 ULFT Water savings (gal/employee/day)		7.80
143		1994 Employees Using ULFT (number of employees)		7,719
144		**1994 Existing Total Wastewater Flow Reduction from ULFT (gal/day)**		**60,205**
145				
146	**Total 1994 Wastewater Flow Reduction (gal/day)**			**224,162**
147				
148		Showers/employee/Day		0.00
149		Low Flow Shower Head Water Savings (gal/shower) (Pre-1992 to Post-1992)		7.20
150		Buildout LFSH Wastewater Flow Reduction per DU (gal/employee/day)		0.00
151		Buildout Total Employees Using LFSH (number of employees)		87,057
152		**Buildout Expected Total Wastewater Flow Reduction from LFSH (gal/day)**		**0**
153		Flushes/Day/Employee		2.0
154		3.5 Gallon Per Flush Toilet Water Savings (GPF) (3.5 GPF Versus 5.5 GPF)		2.00
155		Buildout -3.5 GPF Toilet Wastewater Flow Reduction per Employee (gal/employee/day)		4.00
156		Buildout Total Employees Using 3.5 GPF Toilets (number ofemployees)		0
157		**Buildout Expected Total Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)**		**0**
158		Flushes/Day/Employee		2.0
159		Ultra Low Flow Toilet Savings (GPF) (1.6 GPF Versus 5.5 GPF)		3.90
160		Buildout -3.5 GPF Toilet Wastewater Flow Reduction per Employee (gal/employee/day)		7.80
161		Buildout Total DUs with ULFT		98,500
162		**Buildout Expected Total Wastewater Flow Reduction from ULFT (gal/day)**		**768,300**
163				
164	**Total Buildout Wastewater Flow Reduction (gal/day)**			**768,300**
165				
166				
167	**Determine 1994 Water Meter Program Water Savings**			
168		1994 Actual Measured Wastewater Flow (gal/day)		3,220,000
169		1994 Water Meter Factor		0.01

170	**1994 Water Meter Wastewater Flow Reduction (gal/day)**		**32,200**
171			
172	**Determine 1994 Wastewater Flow and Flow Factor Without Water Conservation Programs**		
173	1994 Actual Measured Water Use (gal/day)		3,220,000
174	1994 Wastewater Flow Reduction from LFSH (gal/day)		0
175	1994 Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)		163,956
176	1994 Wastewater Flow Reduction from ULFT (gal/day)		60,205
177	1994 Water Meter Wastewater Flow Reduction (gal/day)		32,200
178	**1994 Wastewater Flow Without Water Conservation Programs (gal/day)**		**3,476,362**
179	1994 Total DUs		79,467
180	**1994 Without Water Conservation Flow Factor (gal/day/DU)**		**43.7**
181			
182	**Determine 1994 Wastewater Flow and Flow Factor With Water Conservation Programs**		
183	**1994 Actual Measured Wastewater Flow (gal/day)**		**3,220,000**
184	1994 Total DUs		79,467
185	**1994 With Water Conservation Flow Factor (gal/day/DU)**		**40.5**
186			
187	**Determine Buildout Wastewater Flow and Flow Factor With Water Conservation Programs**		
188	Without Conservation Flow Factor (gal/day)		43.7
189	Buildout Total DUs		98,500
190	Buildout Total Without Conservation Wastewater Flow (gal/day)		4,308,979
191	Buildout Wastewater Flow Reduction from LFSH (gal/day)		0
192	Buildout Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)		0
193	Buildout Wastewater Flow Reduction from ULFT (gal/day)		768,300
194	Buildout Water Meter Wastewater Flow Reduction (gal/day)		43,090
195	**Buildout Wastewater Flow With Water Conservation Programs (gal/day)**		**3,497,589**
196	Buildout Total DUs		98,500
197	**Buildout With Water Conservation Flow Factor (gal/day/DU)**		**35.5**

Rohnert Park and Cotati
Residential

A	B	C	D	E
			Input	Output
5		**City**	**Rohnert Park & Cotati**	
6		**Wastewater Type**	**Residential**	
7				
8		**Demographic Information**		
9		Year/Quantity of DU		
10		1980	9,630	
11		1990	15,625	
12		1992 (interpolation between 1990 and 1994)		15,973
13		Unsewered DUs that will be sewered by Buildout	247	
14		1994 and 1994 minus unsewered	16,742	16,495
15		Buildout	19,576	
16		Growth of DU Per Period		
17		Pre 1980		9,630
18		1980-1992		6,343
19		1992-1994		522
20		1994-Buildout		3,081
21				
22		1994 Density (capita/DU)	2.68	
23		Buildout Density (capita/DU)	2.66	
24				
25		**Water Use and Water Conservation Information**		
26		1994 Wastewater Flow Rate (mgd, gal/day)	3.18	3,180,000
27		1994 Average Low Flow Shower Head savings (gpcd)	3.60	
28		Buildout Average Low Flow Shower Head Savings (gpcd)	7.20	
29		3.5 Gallon Per Flush Toilet Water Savings (gal/capita/day) (3.5 GPF Versus 5.5 GPF)	7.97	
30		Ultra Low Flow Toilet Savings (gal/capita/day) (1.6 GPF Versus 5.5 GPF)	10.85	
31		Water Meter Savings Factor (without meters factor = 0.00, with meters factor > 0.00)	0.006	
32				
33		**Determine Number of DUs with Low Flow Shower Heads (LFSH) By Type**		
34		1994 LFSH Penetration Due to Natural Replacemnent (fraction of DUs)	0.60	
35		1994 Quantity of DUs with LFSH Due to Natural Replacement (number of DUs)		9,897
36		1994 Number of DUs with Non-LFSH Replaced Due to Retrofit Program (number of DUs)	4,700	
37				
38		**1994 Total DUs with LFSH (number of DUs)**		**14,597**
39		**1994 Total Non-LFSH (number of DUs)**		**1,898**
40				
41		1994 to Buildout Years Elapsed (years elapsed)	16	
42		1994 to Buildout Annual LFSH Penetration Rate from Natural Replacement (fraction per year)	0.044	
43		1994 to Buildout LFSH Replacement Rate Due To Natural Replacement (DUs/yr)		84
44		1994 to Buildout Fraction of Natural Replacement Replaced Through Retrofit Program	0.20	
45		1994 to Buildout DUs with LFSH Replaced through Natural Replacement (DUs/yr)		67
46		1994 to Buildout DUs with LFSH Replacement Rate Due to Retrofit Program (DUs/yr)	344	
47		1994 to Buildout DUs with LFSH Replacement Rate (DUs/yr)		411
48		1994 to Buildout Total DUs with LFSH Replaced (number of DUs)		6,573
49				
50		1994 to Buildout DUs added to System through New Construction		3,081
51				
52		**Buildout Total LFSH**		**19,576**
53		**Buildout Total Non-LFSH**		**0**
54				
55				
56		**Determine Numbers of DUs with 5.5 Gallon Per Flush (GPF), 3.5 GPF, and Ultra Low Flow Toilet (ULFT, 1.6 GPF) Toilets**		

57				
58		1994 - Toilet Penetration Due to Natural Replacement (fraction, number of DUs)		
59		5.5 GPF (Pre-1980)	0.55	5,297
60		3.5 GPF (Pre-1980)	0.40	3,852
61		3.5 GPF (1980-1992)	0.90	5,709
62		ULFT (Pre-1980)	0.05	482
63		1.6 ULFT (1980-1992)	0.10	634
64		1.6 ULFT (1992-1994)	1.00	522
65				
66		1994 DUs with Replacement of 5.5 GPF and 3.5 GPF toilets With 1.6 GPS Due to Retrofit Program	0	
67		5.5 GPF (Pre-1980)		0
68		3.5 GPF (Pre-1980)		0
69		3.5 GPF (1980-1992)		0
70				
71		1994 Toilet Distribution (number of DUs)		
72		5.5 GPF (Pre-1980)		5,297
73		3.5 GPF (Pre-1980)		3,852
74		3.5 GPF (1980-1992)		5,709
75		ULFT (Pre-1980)		482
76		1.6 ULFT (1980-1992)		634
77		1.6 ULFT (1992-1994)		522
78				
79	**1994 Total DUs with Each Toilet Type**			
80		**5.5 GPF**		**5,297**
81		**3.5 GPF**		**9,561**
82		**ULFT**		**1,638**
83				
84		1994 to Buildout Years Elapsed (years)	16.00	
85		1994 to Buildout Natural Replacement Penetration Rate (fraction per year)	0.027	
86		1994 to Buildout Natural Replacement Rates (DUs per year)		
87		5.5 GPF (Pre-1980)		143
88		3.5 GPF (Pre-1980)		104
89		3.5 GPF (1980-1992)		154
90				
91		1994 to Buildout Fraction of Natural Replacement Replaced Through Retrofit Program (fraction)	0.20	
92		1994 to Buildout Natural Replacement Rates (DUs per year)		
93		5.5 GPF (Pre-1980)		114
94		3.5 GPF (Pre-1980)		83
95		3.5 GPF (1980-1992)		123
96				
97		1994 to Buildout Replacement Rate Through Retrofit Program (DUs per year)	344	
98		5.5 GPF (Pre-1980)		123
99		3.5 GPF (Pre-1980)		89
100		3.5 GPF (1980-1992)		132
101				
102		1994 to Buildout Total Replacememnt Rate (DUs per year)		
103		5.5 GPF (Pre-1980)		237
104		3.5 GPF (Pre-1980)		172
105		3.5 GPF (1980-1992)		255
106				
107		1994 to Buildout Total Toilet Replacements (number of DUs)		
108		5.5 GPF (Pre-1980)		3,793
109		3.5 GPF (Pre-1980)		2,758
110		3.5 GPF (1980-1992)		4,088
111				
112		Buildout Toilet Distribution (number of DUs)		

113		5.5 GPF (Pre-1980)		1,504
114		3.5 GPF (Pre-1980)		1,094
115		3.5 GPF (1980-1992)		1,621
116		ULFT (Pre-1980)		4,274
117		ULFT (1980-1992)		3,393
118		ULFT (1992-1994)		4,610
119		1994 to Buildout DUs with New ULFT added Through New Construction (number of DUs)		3,081
120				
121	**Buildout Toilet Distribution (number of DUs)**			
122		**5.5 GPF**		**1,504**
123		**3.5 GPF**		**2,715**
124		**ULFT**		**15,357**
125				
126				
127	**Determine Existing and Expected Wastewater Flow Reduction From LFSH, 3.5 GPF Toilets, and ULFT**			
128				
129		1994 Capita per DU		2.68
130		1994 LFSH Water Savings (gal/capita/day)		3.60
131		1994 LFSH Wastewater Flow Reduction per DU (gal/day/DU)		9.65
132		1994 Total DUs with LFSH (number of DUs)		14,597
133	**1994 Existing Total Wastewater Flow Recution from LFSH (gal/day)**			**140,832**
134		1994 - 3.5 GPF Toilet Water Savings (gal/capita/day)		7.97
135		1994 -3.5 GPF Toilet Wastewater Flow Reduction per DU (gal/day/DU)		21.36
136		1994 Total DUs with 3.5 GPF Toilets (number of DUs)		9,561
137	**1994 Existing Total Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)**			**204,213**
138		1994 - ULFT Water Savings (gal/capita/day)		10.85
139		1994 ULFT Water savings (gal/DU/day)		29.08
140		1994 DUs with ULFT (number of DUs)		1,638
141	**1994 Existing Total Wastewater Flow Reduction from ULFT (gal/day)**			**47,624**
142				
143	**Total 1994 Wastewater Flow Reduction (gal/day)**			**392,669**
144				
145		Buildout Capita per DU		2.66
146		Buildout LFSH Water Savings (gal/capita/day)		7.20
147		Buildout LFSH Wastewater Flow Reduction per DU (gal/du/day)		19.15
148		Buildout Total DUs with LFSH (number of DUs)		19,576
149	**Buildout Expected Total Wastewater Flow Reduction from LFSH (gal/day)**			**374,920**
150		Buildout - 3.5 GPF Toilet Water Savings (gal/capita/day)		7.97
151		Buildout -3.5 GPF Toilet Wastewater Flow Reduction per DU (gal/DU/day)		21.20
152		Buildout Total DUs with 3.5 GPF Toilets		2,715
153	**Buildout Expected Total Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)**			**57,551**
154		Buildout - ULFT Water Savings (gal/capita/day)		10.85
155		Buildout ULFT Water savings (gal/DU/day)		28.86
156		Buildout Total DUs with ULFT		15,357
157	**Buildout Expected Total Wastewater Flow Reduction from ULFT (gal/day)**			**443,231**
158				
159	**Total Buildout Wastewater Flow Reduction (gal/day)**			**875,702**
160				
161				
162	**Determine 1994 Water Meter Program Water Savings**			
163		1994 Actual Measured Wastewater Flow (gal/day)		3,180,000
164		1994 Water Meter Factor		0.006
165	**1994 Water Meter Wastewater Flow Reduction (gal/day)**			**19,080**
166				
167	**Determine 1994 Wastewater Flow and Flow Factor Without Water Conservation Programs**			
168		1994 Actual Measured Water Use (gal/day)		3,180,000

169		1994 Wastewater Flow Reduction from LFSH (gal/day)		140,832
170		1994 Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)		204,213
171		1994 Wastewater Flow Reduction from ULFT (gal/day)		47,624
172		1994 Water Meter Wastewater Flow Reduction (gal/day)		19,080
173	**1994 Wastewater Flow Without Water Conservation Programs (gal/day)**			**3,591,749**
174		1994 Total DUs		16,495
175	**1994 Without Water Conservation Flow Factor (gal/day/DU)**			**217.7**
176				
177	**Determine 1994 Wastewater Flow and Flow Factor With Water Conservation Programs**			
178	**1994 Actual Measured Wastewater Flow (gal/day)**			**3,180,000**
179		1994 Total DUs		16,495
180	**1994 With Water Conservation Flow Factor (gal/day/DU)**			**192.8**
181				
182	**Determine Buildout Wastewater Flow and Flow Factor With Water Conservation Programs**			
183		Without Conservation Flow Factor (gal/day)		217.7
184		Buildout Total DUs		19,576
185		Buildout Total Without Conservation Wastewater Flow (gal/day)		4,262,629
186		Buildout Wastewater Flow Reduction from LFSH (gal/day)		374,920
187		Buildout Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)		57,551
188		Buildout Wastewater Flow Reduction from ULFT (gal/day)		443,231
189		Buildout Water Meter Wastewater Flow Reduction (gal/day)		25,576
190	**Buildout Wastewater Flow With Water Conservation Programs (gal/day)**			**3,361,351**
191		Buildout Total DUs		19,576
192	**Buildout With Water Conservation Flow Factor (gal/day/DU)**			**171.7**

Rohnert Park and Cotati
Commercial, Industrial, Institutional

A	B	C	D	E
			Input	Output
5		City	Rohnert Park & Cotati	
6		**Wastewater Type**	**CII**	
7				
8		**Demographic Information**		
9		Year/Number of Employees		
10		1980	6,124	
11		1990	12,680	
12		1992 (interpolation between 1990 and 1994)		13,839
13		Unsewered DUs that will be Sewered by Buildout	0	
14		1994 and 1994 minus unsewered	15,578	15,578
15		Buildout	22,331	
16		Increase of Employees Per Period		
17		Pre 1980		6,124
18		1980-1992		7,715
19		1992-1994		1,739
20		1994-Buildout		6,753
21				
22				
23		**Water Use and Water Conservation Information**		
24		Showers/Day/Employee	0.00	
25		Flushes/Day/Employee	2.00	
26		1994 Wastewater Flow Rate (mgd, gal/day)	0.48	480,000
27		Low Flow Shower Head Water Savings (gal/shower/day) (Pre-1992 to Post-1992)	3.60	
28		3.5 Gallon Per Flush Toilet Water Savings (GPF) (3.5 GPF Versus 5.5 GPF)	2.00	
29		Ultra Low Flow Toilet Savings (GPF) (1.6 GPF Versus 5.5 GPF)	3.90	
30		Water Meter Savings Factor (without meters factor = 0.00, with meters factor > 0.00)	0.010	
31				
32		**Determine Number of Employees Using Low Flow Shower Heads (LFSH) and Non-LFSH**		
33		1994 LFSH Penetration Due to Natural Replacemnent (fraction of employees)	0.60	
34		1994 Employees Using LFSH Due to Natural Replacement (number of employees)		9,347
35		1994 Employees Using Non-LFSH Replaced Due to Retrofit Program (number of employees)	0	
36				
37		**1994 Total Employees Using LFSH (number of employees)**		**9,347**
38		**1994 Total Employees Using Non-LFSH (number of employees)**		**6,231**
39				
40		1994 to Buildout Years Elapsed (years elapsed)	16	
41		1994 to Buildout Annual LFSH Penetration Rate from Natural Replacement (fraction per year)	0.05	
42		1994 to Buildout LFSH Replacement Rate Due To Natural Replacement (employees/yr)		312
43		1994 to Buildout Fraction of Natural Replacement Replaced Through Retrofit Program	0.00	
44		1994 to Buildout Employees using LFSH Replaced through Natural Replacement (employees/yr)		312
45		1994 to Buildout Employees Using LFSH Replacement Rate Due to Retrofit Program (employees/yr)	0	
46		1994 to Buildout Employees Using LFSH Replacement Rate (Employees/yr)		312
47		1994 to Buildout Total Employees Using LFSH Replaced (number of employees)		4,985
48				
49		1994 to Buildout Employees Using LFSH added Through New Construction		6,753
50				
51		**Buildout Total Employees Using LFSH**		**21,085**
52		**Buildout Total Employees UsingNon-LFSH**		**1,246**
53				
54				
55		**Determine Numbers of Employees Using 5.5 Gallon Per Flush (GPF), 3.5 GPF, and Ultra Low Flow Toilet (ULFT, 1.6 GPF) T**		
56				

57		1994 - Toilet Penetration Due to Natural Replacement (fraction, number of employees)		
58		5.5 GPF (Pre-1980)	0.55	3,368
59		3.5 GPF (Pre-1980)	0.40	2,450
60		3.5 GPF (1980-1992)	0.90	6,944
61		ULFT (Pre-1980)	0.05	306
62		1.6 ULFT (1980-1992)	0.10	772
63		1.6 ULFT (1992-1994)	1.00	1,739
64				
65		1994 Number of Employees Using 5.5 GPF and 3.5 GPF toilets With 1.6 GPS Due to Retrofit Progra	0	
66		5.5 GPF (Pre-1980)		0
67		3.5 GPF (Pre-1980)		0
68		3.5 GPF (1980-1992)		0
69				
70		1994 Employee-Toilet Use Distribution (number of employeess)		
71		5.5 GPF (Pre-1980)		3,368
72		3.5 GPF (Pre-1980)		2,450
73		3.5 GPF (1980-1992)		6,944
74		ULFT (Pre-1980)		306
75		1.6 ULFT (1980-1992)		772
76		1.6 ULFT (1992-1994)		1,739
77				
78	**1994 Total Employees Using Each Toilet Type**			
79		**5.5 GPF**		**3,368**
80		**3.5 GPF**		**9,393**
81		**ULFT**		**2,817**
82				
83		1994 to Buildout Years Elapsed (years)	16	
84		1994 to Buildout Natural Replacement Penetration Rate (fraction per year)	0.03	
85		1994 to Buildout Natural Replacement Rates (employees per year)		
86		5.5 GPF (Pre-1980)		101
87		3.5 GPF (Pre-1980)		73
88		3.5 GPF (1980-1992)		208
89				
90		1994 to Buildout Fraction of Natural Replacement Replaced Through Retrofit Program (fraction)	0.00	
91		1994 to Buildout Natural Replacement Rates (employees per year)		
92		5.5 GPF (Pre-1980)		101
93		3.5 GPF (Pre-1980)		73
94		3.5 GPF (1980-1992)		208
95				
96		1994 to Buildout Replacement Rate Through Retrofit Program (toilets per year)	0	
97		Ratio of Employees to Toilets	10	
98		1994 to Buildout Replacement Rate Through Retrofit Program (employees per year)	0	
99		5.5 GPF (Pre-1980)		0
100		3.5 GPF (Pre-1980)		0
101		3.5 GPF (1980-1992)		0
102				
103		1994 to Buildout Total Replacememnt Rate (employees per year)		
104		5.5 GPF (Pre-1980)		101
105		3.5 GPF (Pre-1980)		73
106		3.5 GPF (1980-1992)		208
107				
108		1994 to Buildout Total Toilet Replacements (number of employees)		
109		5.5 GPF (Pre-1980)		1,617
110		3.5 GPF (Pre-1980)		1,176
111		3.5 GPF (1980-1992)		3,333
112				

113		Buildout Employee Use Toilet Distribution (number of employees)		
114		5.5 GPF (Pre-1980)		1,751
115		3.5 GPF (Pre-1980)		1,274
116		3.5 GPF (1980-1992)		3,611
117		ULFT (Pre-1980)		1,923
118		ULFT (1980-1992)		1,947
119		ULFT (1992-1994)		5,072
120	1994 to Buildout Employees Using New ULFT added Through New Construction (number of employees)			6,753
121				
122	**Buildout Employee Toilet Use Distribution (number of employees)**			
123		**5.5 GPF**		**1,751**
124		**3.5 GPF**		**4,885**
125		**ULFT**		**15,695**
126				
127				
128	**Determine Existing and Expected Wastewater Flow Reduction From LFSH, 3.5 GPF Toilets, and ULFT**			
129				
130		Showers/Day/Employee		0.00
131		Low Flow Shower Head Water Savings (gal/shower/day) (Pre-1992 to Post-1992)		3.60
132		1994 LFSH Wastewater Flow Reduction per Employee (gal/employee/day)		0.00
133		1994 Total Employees Using LFSH (number of DUs)		9,347
134	**1994 Existing Total Wastewater Flow Reduction from LFSH (gal/day)**			**0**
135		Flushes/Day/Employee		2.0
136		3.5 Gallon Per Flush Toilet Water Savings (GPF) (3.5 GPF Versus 5.5 GPF)		2.00
137		1994 -3.5 GPF Toilet Wastewater Flow Reduction per Employee (gal/employee/day)		4.00
138		1994 Total Employees Using 3.5 GPF Toilets (number of employees)		9,393
139	**1994 Existing Total Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)**			**37,573**
140		Flushes/Day/Employee		2
141		Ultra Low Flow Toilet Savings (GPF) (1.6 GPF Versus 5.5 GPF)		3.90
142		1994 ULFT Water savings (gal/employee/day)		7.80
143		1994 Employees Using ULFT (number of employees)		2,817
144	**1994 Existing Total Wastewater Flow Reduction from ULFT (gal/day)**			**21,969**
145				
146	**Total 1994 Wastewater Flow Reduction (gal/day)**			**59,542**
147				
148		Showers/employee/Day		0.00
149		Low Flow Shower Head Water Savings (gal/shower) (Pre-1992 to Post-1992)		3.60
150		Buildout LFSH Wastewater Flow Reduction per DU (gal/employee/day)		0.00
151		Buildout Total Employees Using LFSH (number of employees)		21,085
152	**Buildout Expected Total Wastewater Flow Reduction from LFSH (gal/day)**			**0**
153		Flushes/Day/Employee		2.0
154		3.5 Gallon Per Flush Toilet Water Savings (GPF) (3.5 GPF Versus 5.5 GPF)		2.00
155		Buildout -3.5 GPF Toilet Wastewater Flow Reduction per Employee (gal/employee/day)		4.00
156		Buildout Total Employees Using 3.5 GPF Toilets (number ofemployees)		4,885
157	**Buildout Expected Total Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)**			**19,538**
158		Flushes/Day/Employee		2.0
159		Ultra Low Flow Toilet Savings (GPF) (1.6 GPF Versus 5.5 GPF)		3.90
160		Buildout -3.5 GPF Toilet Wastewater Flow Reduction per Employee (gal/employee/day)		7.80
161		Buildout Total DUs with ULFT		15,695
162	**Buildout Expected Total Wastewater Flow Reduction from ULFT (gal/day)**			**122,421**
163				
164	**Total Buildout Wastewater Flow Reduction (gal/day)**			**141,959**
165				
166				
167	**Determine 1994 Water Meter Program Water Savings**			
168		1994 Actual Measured Wastewater Flow (gal/day)		480,000

169	1994 Water Meter Factor		0.01
170	**1994 Water Meter Wastewater Flow Reduction (gal/day)**		**4,800**
171			
172	**Determine 1994 Wastewater Flow and Flow Factor Without Water Conservation Programs**		
173	1994 Actual Measured Water Use (gal/day)		480,000
174	1994 Wastewater Flow Reduction from LFSH (gal/day)		0
175	1994 Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)		37,573
176	1994 Wastewater Flow Reduction from ULFT (gal/day)		21,969
177	1994 Water Meter Wastewater Flow Reduction (gal/day)		4,800
178	**1994 Wastewater Flow Without Water Conservation Programs (gal/day)**		**544,342**
179	1994 Total DUs		15,578
180	**1994 Without Water Conservation Flow Factor (gal/day/DU)**		**34.9**
181			
182	**Determine 1994 Wastewater Flow and Flow Factor With Water Conservation Programs**		
183	**1994 Actual Measured Wastewater Flow (gal/day)**		**480,000**
184	1994 Total DUs		15,578
185	**1994 With Water Conservation Flow Factor (gal/day/DU)**		**30.8**
186			
187	**Determine Buildout Wastewater Flow and Flow Factor With Water Conservation Programs**		
188	Without Conservation Flow Factor (gal/day)		34.9
189	Buildout Total DUs		22,331
190	Buildout Total Without Conservation Wastewater Flow (gal/day)		780,312
191	Buildout Wastewater Flow Reduction from LFSH (gal/day)		0
192	Buildout Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)		19,538
193	Buildout Wastewater Flow Reduction from ULFT (gal/day)		122,421
194	Buildout Water Meter Wastewater Flow Reduction (gal/day)		7,803
195	**Buildout Wastewater Flow With Water Conservation Programs (gal/day)**		**630,550**
196	Buildout Total DUs		22,331
197	**Buildout With Water Conservation Flow Factor (gal/day/DU)**		**28.2**

Sebastopol
Residential

A	B	C	D	E
			Input	Output
5		**City**	**Sebastopol**	
6		**Wastewater Type**	**Residential**	
7				
8		**Demographic Information**		
9		Year/Quantity of DU		
10		1980	2,358	
11		1990	2,843	
12		1992 (interpolation between 1990 and 1994)		2,912
13		Unsewered DUs that will be sewered by Buildout	0	
14		1994 and 1994 minus unsewered	3,015	3,015
15		Buildout	4,359	
16		Growth of DU Per Period		
17		Pre 1980		2,358
18		1980-1992		554
19		1992-1994		103
20		1994-Buildout		1,344
21				
22		1994 Density (capita/DU)	2.42	
23		Buildout Density (capita/DU)	2.39	
24				
25		**Water Use and Water Conservation Information**		
26		1994 Wastewater Flow Rate (mgd, gal/day)	0.38	380,000
27		1994 Average Low Flow Shower Head savings (gpcd)	3.60	
28		Buildout Average Low Flow Shower Head Savings (gpcd)	7.00	
29		3.5 Gallon Per Flush Toilet Water Savings (gal/capita/day) (3.5 GPF Versus 5.5 GPF)	5.62	
30		Ultra Low Flow Toilet Savings (gal/capita/day) (1.6 GPF Versus 5.5 GPF)	7.65	
31		Water Meter Savings Factor (without meters factor = 0.00, with meters factor > 0.00)	0.01	
32				
33		**Determine Number of DUs with Low Flow Shower Heads (LFSH) By Type**		
34		1994 LFSH Penetration Due to Natural Replacemnent (fraction of DUs)	0.60	
35		1994 Quantity of DUs with LFSH Due to Natural Replacement (number of DUs)		1,809
36		1994 Number of DUs with Non-LFSH Replaced Due to Retrofit Program (number of DUs)	0	
37				
38		**1994 Total DUs with LFSH (number of DUs)**		**1,809**
39		**1994 Total Non-LFSH (number of DUs)**		**1,206**
40				
41		1994 to Buildout Years Elapsed (years elapsed)	16	
42		1994 to Buildout Annual LFSH Penetration Rate from Natural Replacement (fraction per year)	0.05	
43		1994 to Buildout LFSH Replacement Rate Due To Natural Replacement (DUs/yr)		60
44		1994 to Buildout Fraction of Natural Replacement Replaced Through Retrofit Program	0.00	
45		1994 to Buildout DUs with LFSH Replaced through Natural Replacement (DUs/yr)		60
46		1994 to Buildout DUs with LFSH Replacement Rate Due to Retrofit Program (DUs/yr)	0	
47		1994 to Buildout DUs with LFSH Replacement Rate (DUs/yr)		60
48		1994 to Buildout Total DUs with LFSH Replaced (number of DUs)		965
49				
50		1994 to Buildout DUs added to System through New Construction		1,344
51				
52		**Buildout Total LFSH**		**4,118**
53		**Buildout Total Non-LFSH**		**241**
54				
55				
56		**Determine Numbers of DUs with 5.5 Gallon Per Flush (GPF), 3.5 GPF, and Ultra Low Flow Toilet (ULFT, 1.6 GPF) Toilets**		
57				

58		1994 - Toilet Penetration Due to Natural Replacement (fraction, number of DUs)		
59		5.5 GPF (Pre-1980)	0.55	1,297
60		3.5 GPF (Pre-1980)	0.40	943
61		3.5 GPF (1980-1992)	0.80	443
62		ULFT (Pre-1980)	0.05	118
63		1.6 ULFT (1980-1992)	0.20	111
64		1.6 ULFT (1992-1994)	1.00	103
65				
66		1994 DUs with Replacement of 5.5 GPF and 3.5 GPF toilets With 1.6 GPS Due to Retrofit Program	150	
67		5.5 GPF (Pre-1980)		73
68		3.5 GPF (Pre-1980)		53
69		3.5 GPF (1980-1992)		25
70				
71		1994 Toilet Distribution (number of DUs)		
72		5.5 GPF (Pre-1980)		1,224
73		3.5 GPF (Pre-1980)		890
74		3.5 GPF (1980-1992)		418
75		ULFT (Pre-1980)		190
76		1.6 ULFT (1980-1992)		163
77		1.6 ULFT (1992-1994)		128
78				
79	**1994 Total DUs with Each Toilet Type**			
80		**5.5 GPF**		**1,224**
81		**3.5 GPF**		**1,309**
82		**ULFT**		**482**
83				
84		1994 to Buildout Years Elapsed (years)	16.00	
85		1994 to Buildout Natural Replacement Penetration Rate (fraction per year)	0.03	
86		1994 to Buildout Natural Replacement Rates (DUs per year)		
87		5.5 GPF (Pre-1980)		37
88		3.5 GPF (Pre-1980)		27
89		3.5 GPF (1980-1992)		13
90				
91		1994 to Buildout Fraction of Natural Replacement Replaced Through Retrofit Program (fraction)	0.30	
92		1994 to Buildout Natural Replacement Rates (DUs per year)		
93		5.5 GPF (Pre-1980)		26
94		3.5 GPF (Pre-1980)		19
95		3.5 GPF (1980-1992)		9
96				
97		1994 to Buildout Replacement Rate Through Retrofit Program (DUs per year)	24	
98		5.5 GPF (Pre-1980)		12
99		3.5 GPF (Pre-1980)		8
100		3.5 GPF (1980-1992)		4
101				
102		1994 to Buildout Total Replacememnt Rate (DUs per year)		
103		5.5 GPF (Pre-1980)		37
104		3.5 GPF (Pre-1980)		27
105		3.5 GPF (1980-1992)		13
106				
107		1994 to Buildout Total Toilet Replacements (number of DUs)		
108		5.5 GPF (Pre-1980)		597
109		3.5 GPF (Pre-1980)		434
110		3.5 GPF (1980-1992)		204
111				
112		Buildout Toilet Distribution (number of DUs)		
113		5.5 GPF (Pre-1980)		627

114		3.5 GPF (Pre-1980)		456
115		3.5 GPF (1980-1992)		214
116		ULFT (Pre-1980)		787
117		ULFT (1980-1992)		598
118		ULFT (1992-1994)		332
119		1994 to Buildout DUs with New ULFT added Through New Construction (number of DUs)		1,344
120				
121	**Buildout Toilet Distribution (number of DUs)**			
122		**5.5 GPF**		**627**
123		**3.5 GPF**		**671**
124		**ULFT**		**3,061**
125				
126				
127	**Determine Existing and Expected Wastewater Flow Reduction From LFSH, 3.5 GPF Toilets, and ULFT**			
128				
129		1994 Capita per DU		2.42
130		1994 LFSH Water Savings (gal/capita/day)		3.60
131		1994 LFSH Wastewater Flow Reduction per DU (gal/day/DU)		8.71
132		1994 Total DUs with LFSH (number of DUs)		1,809
133	**1994 Existing Total Wastewater Flow Recution from LFSH (gal/day)**			**15,760**
134		1994 - 3.5 GPF Toilet Water Savings (gal/capita/day)		5.62
135		1994 -3.5 GPF Toilet Wastewater Flow Reduction per DU (gal/day/DU)		13.60
136		1994 Total DUs with 3.5 GPF Toilets (number of DUs)		1,309
137	**1994 Existing Total Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)**			**17,799**
138		1994 - ULFT Water Savings (gal/capita/day)		7.65
139		1994 ULFT Water savings (gal/DU/day)		18.51
140		1994 DUs with ULFT (number of DUs)		482
141	**1994 Existing Total Wastewater Flow Reduction from ULFT (gal/day)**			**8,921**
142				
143	**Total 1994 Wastewater Flow Reduction (gal/day)**			**42,480**
144				
145		Buildout Capita per DU		2.39
146		Buildout LFSH Water Savings (gal/capita/day)		7.00
147		Buildout LFSH Wastewater Flow Reduction per DU (gal/du/day)		16.73
148		Buildout Total DUs with LFSH (number of DUs)		4,118
149	**Buildout Expected Total Wastewater Flow Reduction from LFSH (gal/day)**			**68,891**
150		Buildout - 3.5 GPF Toilet Water Savings (gal/capita/day)		5.62
151		Buildout -3.5 GPF Toilet Wastewater Flow Reduction per DU (gal/DU/day)		13.43
152		Buildout Total DUs with 3.5 GPF Toilets		671
153	**Buildout Expected Total Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)**			**9,008**
154		Buildout - ULFT Water Savings (gal/capita/day)		7.65
155		Buildout ULFT Water savings (gal/DU/day)		18.28
156		Buildout Total DUs with ULFT		3,061
157	**Buildout Expected Total Wastewater Flow Reduction from ULFT (gal/day)**			**55,966**
158				
159	**Total Buildout Wastewater Flow Reduction (gal/day)**			**133,864**
160				
161				
162	**Determine 1994 Water Meter Program Water Savings**			
163		1994 Actual Measured Wastewater Flow (gal/day)		380,000
164		1994 Water Meter Factor		0.01
165	**1994 Water Meter Wastewater Flow Reduction (gal/day)**			**3,800**
166				
167	**Determine 1994 Wastewater Flow and Flow Factor Without Water Conservation Programs**			
168		1994 Actual Measured Water Use (gal/day)		380,000
169		1994 Wastewater Flow Reduction from LFSH (gal/day)		15,760

170		1994 Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)		17,799
171		1994 Wastewater Flow Reduction from ULFT (gal/day)		8,921
172		1994 Water Meter Wastewater Flow Reduction (gal/day)		3,800
173	**1994 Wastewater Flow Without Water Conservation Programs (gal/day)**			**426,280**
174		1994 Total DUs		3,015
175	**1994 Without Water Conservation Flow Factor (gal/day/DU)**			**141.4**
176				
177	**Determine 1994 Wastewater Flow and Flow Factor With Water Conservation Programs**			
178	**1994 Actual Measured Wastewater Flow (gal/day)**			**380,000**
179		1994 Total DUs		3,015
180	**1994 With Water Conservation Flow Factor (gal/day/DU)**			**126.0**
181				
182	**Determine Buildout Wastewater Flow and Flow Factor With Water Conservation Programs**			
183		Without Conservation Flow Factor (gal/day)		141.4
184		Buildout Total DUs		4,359
185		Buildout Total Without Conservation Wastewater Flow (gal/day)		616,303
186		Buildout Wastewater Flow Reduction from LFSH (gal/day)		68,891
187		Buildout Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)		9,008
188		Buildout Wastewater Flow Reduction from ULFT (gal/day)		55,966
189		Buildout Water Meter Wastewater Flow Reduction (gal/day)		6,163
190	**Buildout Wastewater Flow With Water Conservation Programs (gal/day)**			**476,276**
191		Buildout Total DUs		4,359
192	**Buildout With Water Conservation Flow Factor (gal/day/DU)**			**109.3**

Sebastopol
Commercial, Industrial, Institutional

A	B	C	D	E
			Input	Output
5		**City**	**Sebastopol**	
6		**Wastewater Type**	**CII**	
7				
8		**Demographic Information**		
9		Year/Number of Employees		
10		1980	3,220	
11		1990	4,770	
12		1992 (interpolation between 1990 and 1994)		4,975
13		Unsewered DUs that will be Sewered by Buildout	0	
14		1994 and 1994 minus unsewered	5,282	5,282
15		Buildout	6,600	
16		Increase of Employees Per Period		
17		Pre 1980		3,220
18		1980-1992		1,755
19		1992-1994		307
20		1994-Buildout		1,318
21				
22				
23		**Water Use and Water Conservation Information**		
24		Showers/Day/Employee	0.00	
25		Flushes/Day/Employee	2.00	
26		1994 Wastewater Flow Rate (mgd, gal/day)	0.22	220,000
27		Low Flow Shower Head Water Savings (gal/shower/day) (Pre-1992 to Post-1992)	3.60	
28		3.5 Gallon Per Flush Toilet Water Savings (GPF) (3.5 GPF Versus 5.5 GPF)	2.00	
29		Ultra Low Flow Toilet Savings (GPF) (1.6 GPF Versus 5.5 GPF)	3.90	
30		Water Meter Savings Factor (without meters factor = 0.00, with meters factor > 0.00)	0.010	
31				
32		**Determine Number of Employees Using Low Flow Shower Heads (LFSH) and Non-LFSH**		
33		1994 LFSH Penetration Due to Natural Replacemnent (fraction of employees)	0.60	
34		1994 Employees Using LFSH Due to Natural Replacement (number of employees)		3,169
35		1994 Employees Using Non-LFSH Replaced Due to Retrofit Program (number of employees)	0	
36				
37		**1994 Total Employees Using LFSH (number of employees)**		**3,169**
38		**1994 Total Employees Using Non-LFSH (number of employees)**		**2,113**
39				
40		1994 to Buildout Years Elapsed (years elapsed)	16	
41		1994 to Buildout Annual LFSH Penetration Rate from Natural Replacement (fraction per year)	0.05	
42		1994 to Buildout LFSH Replacement Rate Due To Natural Replacement (employees/yr)		106
43		1994 to Buildout Fraction of Natural Replacement Replaced Through Retrofit Program	0.00	
44		1994 to Buildout Employees using LFSH Replaced through Natural Replacement (employees/yr)		106
45		1994 to Buildout Employees Using LFSH Replacement Rate Due to Retrofit Program (employees/yr)	0	
46		1994 to Buildout Employees Using LFSH Replacement Rate (Employees/yr)		106
47		1994 to Buildout Total Employees Using LFSH Replaced (number of employees)		1,690
48				
49		1994 to Buildout Employees Using LFSH added Through New Construction		1,318
50				
51		**Buildout Total Employees Using LFSH**		**6,177**
52		**Buildout Total Employees UsingNon-LFSH**		**423**
53				
54				
55		**Determine Numbers of Employees Using 5.5 Gallon Per Flush (GPF), 3.5 GPF, and Ultra Low Flow Toilet (ULFT, 1.6 GPF) T**		
56				

57		1994 - Toilet Penetration Due to Natural Replacement (fraction, number of employees)		
58		5.5 GPF (Pre-1980)	0.55	1,771
59		3.5 GPF (Pre-1980)	0.40	1,288
60		3.5 GPF (1980-1992)	0.90	1,579
61		ULFT (Pre-1980)	0.05	161
62		1.6 ULFT (1980-1992)	0.10	175
63		1.6 ULFT (1992-1994)	1.00	307
64		-		
65		1994 Number of Employees Using 5.5 GPF and 3.5 GPF toilets With 1.6 GPS Due to Retrofit Progra	0	
66		5.5 GPF (Pre-1980)		0
67		3.5 GPF (Pre-1980)		0
68		3.5 GPF (1980-1992)		0
69				
70		1994 Employee-Toilet Use Distribution (number of employeess)		
71		5.5 GPF (Pre-1980)		1,771
72		3.5 GPF (Pre-1980)		1,288
73		3.5 GPF (1980-1992)		1,579
74		ULFT (Pre-1980)		161
75		1.6 ULFT (1980-1992)		175
76		1.6 ULFT (1992-1994)		307
77				
78	**1994 Total Employees Using Each Toilet Type**			
79		**5.5 GPF**		**1,771**
80		**3.5 GPF**		**2,867**
81		**ULFT**		**644**
82				
83		1994 to Buildout Years Elapsed (years)	16	
84		1994 to Buildout Natural Replacement Penetration Rate (fraction per year)	0.03	
85		1994 to Buildout Natural Replacement Rates (employees per year)		
86		5.5 GPF (Pre-1980)		53
87		3.5 GPF (Pre-1980)		39
88		3.5 GPF (1980-1992)		47
89				
90		1994 to Buildout Fraction of Natural Replacement Replaced Through Retrofit Program (fraction)	0.00	
91		1994 to Buildout Natural Replacement Rates (employees per year)		
92		5.5 GPF (Pre-1980)		53
93		3.5 GPF (Pre-1980)		39
94		3.5 GPF (1980-1992)		47
95				
96		1994 to Buildout Replacement Rate Through Retrofit Program (toilets per year)	0	
97		Ratio of Employees to Toilets	10	
98		1994 to Buildout Replacement Rate Through Retrofit Program (employees per year)	0	
99		5.5 GPF (Pre-1980)		0
100		3.5 GPF (Pre-1980)		0
101		3.5 GPF (1980-1992)		0
102				
103		1994 to Buildout Total Replacememnt Rate (employees per year)		
104		5.5 GPF (Pre-1980)		53
105		3.5 GPF (Pre-1980)		39
106		3.5 GPF (1980-1992)		47
107				
108		1994 to Buildout Total Toilet Replacements (number of employees)		
109		5.5 GPF (Pre-1980)		850
110		3.5 GPF (Pre-1980)		618
111		3.5 GPF (1980-1992)		758
112				

113		Buildout Employee Use Toilet Distribution (number of employees)		
114		5.5 GPF (Pre-1980)		921
115		3.5 GPF (Pre-1980)		670
116		3.5 GPF (1980-1992)		821
117		ULFT (Pre-1980)		1,011
118		ULFT (1980-1992)		794
119		ULFT (1992-1994)		1,065
120	1994 to Buildout Employees Using New ULFT added Through New Construction (number of employees)			1,318
121				
122	**Buildout Employee Toilet Use Distribution (number of employees)**			
123		**5.5 GPF**		**921**
124		**3.5 GPF**		**1,491**
125		**ULFT**		**4,188**
126				
127				
128	**Determine Existing and Expected Wastewater Flow Reduction From LFSH, 3.5 GPF Toilets, and ULFT**			
129				
130		Showers/Day/Employee		0.00
131		Low Flow Shower Head Water Savings (gal/shower/day) (Pre-1992 to Post-1992)		3.60
132		1994 LFSH Wastewater Flow Reduction per Employee (gal/employee/day)		0.00
133		1994 Total Employees Using LFSH (number of DUs)		3,169
134	**1994 Existing Total Wastewater Flow Reduction from LFSH (gal/day)**			**0**
135		Flushes/Day/Employee		2.0
136		3.5 Gallon Per Flush Toilet Water Savings (GPF) (3.5 GPF Versus 5.5 GPF)		2.00
137		1994 -3.5 GPF Toilet Wastewater Flow Reduction per Employee (gal/employee/day)		4.00
138		1994 Total Employees Using 3.5 GPF Toilets (number of employees)		2,867
139	**1994 Existing Total Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)**			**11,469**
140		Flushes/Day/Employee		2
141		Ultra Low Flow Toilet Savings (GPF) (1.6 GPF Versus 5.5 GPF)		3.90
142		1994 ULFT Water savings (gal/employee/day)		7.80
143		1994 Employees Using ULFT (number of employees)		644
144	**1994 Existing Total Wastewater Flow Reduction from ULFT (gal/day)**			**5,021**
145				
146	**Total 1994 Wastewater Flow Reduction (gal/day)**			**16,490**
147				
148		Showers/employee/Day		0.00
149		Low Flow Shower Head Water Savings (gal/shower) (Pre-1992 to Post-1992)		3.60
150		Buildout LFSH Wastewater Flow Reduction per DU (gal/employee/day)		0.00
151		Buildout Total Employees Using LFSH (number of employees)		6,177
152	**Buildout Expected Total Wastewater Flow Reduction from LFSH (gal/day)**			**0**
153		Flushes/Day/Employee		2.0
154		3.5 Gallon Per Flush Toilet Water Savings (GPF) (3.5 GPF Versus 5.5 GPF)		2.00
155		Buildout -3.5 GPF Toilet Wastewater Flow Reduction per Employee (gal/employee/day)		4.00
156		Buildout Total Employees Using 3.5 GPF Toilets (number ofemployees)		1,491
157	**Buildout Expected Total Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)**			**5,964**
158		Flushes/Day/Employee		2.0
159		Ultra Low Flow Toilet Savings (GPF) (1.6 GPF Versus 5.5 GPF)		3.90
160		Buildout -3.5 GPF Toilet Wastewater Flow Reduction per Employee (gal/employee/day)		7.80
161		Buildout Total DUs with ULFT		4,188
162	**Buildout Expected Total Wastewater Flow Reduction from ULFT (gal/day)**			**32,667**
163				
164	**Total Buildout Wastewater Flow Reduction (gal/day)**			**38,631**
165				
166				
167	**Determine 1994 Water Meter Program Water Savings**			
168		1994 Actual Measured Wastewater Flow (gal/day)		220,000

169	1994 Water Meter Factor	0.01
170	**1994 Water Meter Wastewater Flow Reduction (gal/day)**	**2,200**
171		
172	**Determine 1994 Wastewater Flow and Flow Factor Without Water Conservation Programs**	
173	1994 Actual Measured Water Use (gal/day)	220,000
174	1994 Wastewater Flow Reduction from LFSH (gal/day)	0
175	1994 Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)	11,469
176	1994 Wastewater Flow Reduction from ULFT (gal/day)	5,021
177	1994 Water Meter Wastewater Flow Reduction (gal/day)	2,200
178	**1994 Wastewater Flow Without Water Conservation Programs (gal/day)**	**238,690**
179	1994 Total DUs	5.282
180	**1994 Without Water Conservation Flow Factor (gal/day/DU)**	**45.2**
181		
182	**Determine 1994 Wastewater Flow and Flow Factor With Water Conservation Programs**	
183	**1994 Actual Measured Wastewater Flow (gal/day)**	**220,000**
184	1994 Total DUs	5.282
185	**1994 With Water Conservation Flow Factor (gal/day/DU)**	**41.7**
186		
187	**Determine Buildout Wastewater Flow and Flow Factor With Water Conservation Programs**	
188	Without Conservation Flow Factor (gal/day)	45.2
189	Buildout Total DUs	6,600
190	Buildout Total Without Conservation Wastewater Flow (gal/day)	298,250
191	Buildout Wastewater Flow Reduction from LFSH (gal/day)	0
192	Buildout Wastewater Flow Reduction from 3.5 GPF Toilets (gal/day)	5,964
193	Buildout Wastewater Flow Reduction from ULFT (gal/day)	32,667
194	Buildout Water Meter Wastewater Flow Reduction (gal/day)	2,982
195	**Buildout Wastewater Flow With Water Conservation Programs (gal/day)**	**256,636**
196	Buildout Total DUs	6,600
197	**Buildout With Water Conservation Flow Factor (gal/day/DU)**	**38.9**