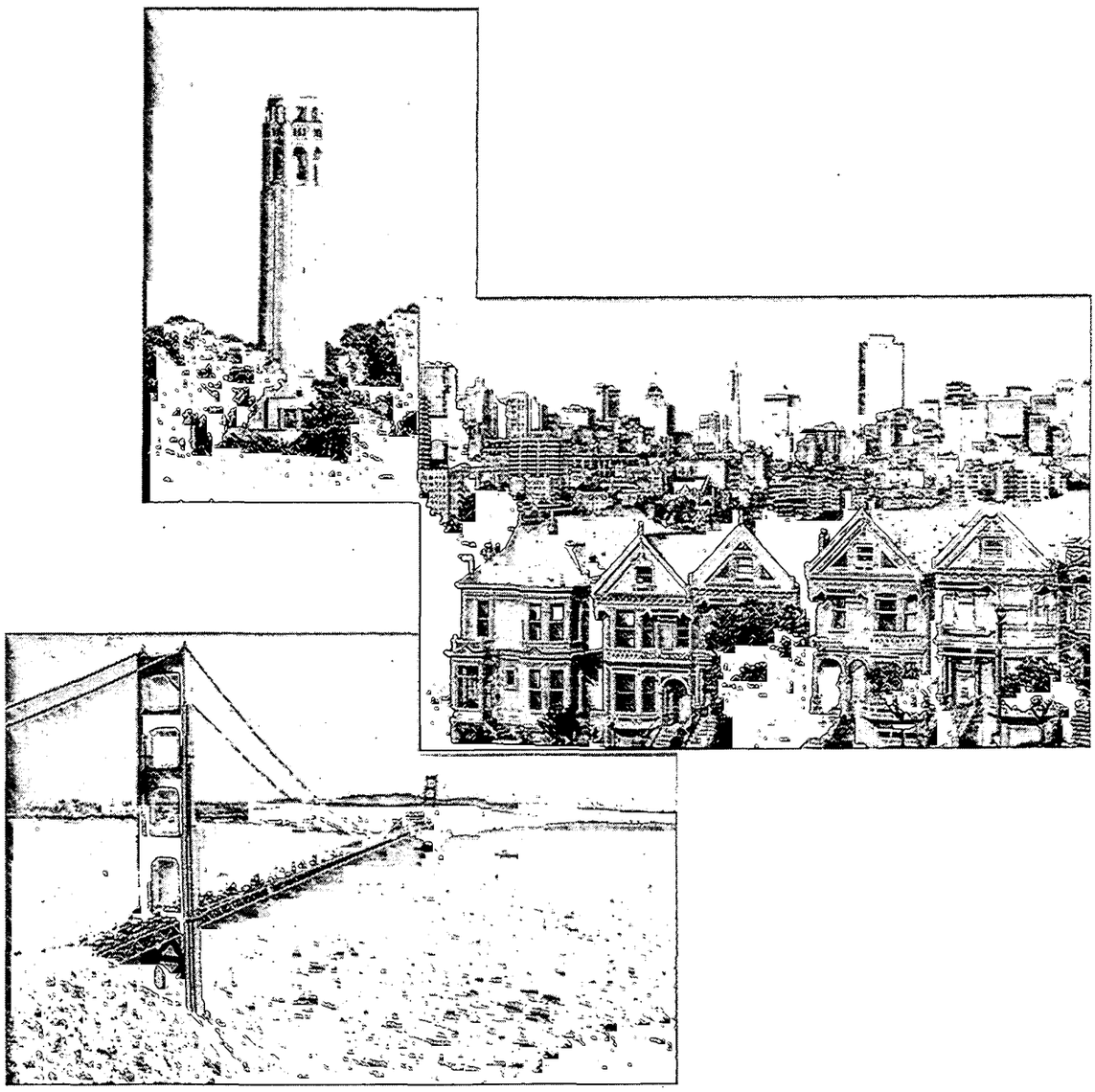
The Urban Water Management Plan for the City and County of San Francisco

Retail Operations



Public Utilities Commission of the City and County of San Francisco
March 1996

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I. INTRODUCTION

This report has been prepared in response to The *Urban Water Management Planning Act* which was passed in 1983. Originally enacted as Assembly Bill (AB) Number 797, this Act requires that every urban water supplier that provides water directly or indirectly to more than 3,000 customers or supplies more than 3,000 acre-feet of water annually to develop a water management plan and schedules for implementing conservation measures and demand-side management programs on a five-year basis, and report these plans to the California State Legislature through the Department of Water Resources (DWR).

The Act has been amended several times since 1983. Amendments to the Act have provided additional clarification and emphasis to certain aspects of urban water planning such as drought contingency planning.

The San Francisco Public Utilities Commission (Commission) through the San Francisco Water Department (Water Department) prepared and submitted an *Urban Water Management Plan* in 1985 and subsequently updated its plan in 1990. In response to AB11x (1991), the Water Department also prepared a *Water Shortage Contingency Plan* which addressed the on-going shortage of water supply caused by the drought of 1987-92.

The City and County of San Francisco (San Francisco) provides water to both retail and wholesale water customers. This report primarily addresses the Water Department's retail delivery of water to San Francisco's 760,000 residents and approximately 300 suburban residential and commercial accounts. However, by necessity, certain aspects of San Francisco's wholesale water delivery operations to customers in the Bay Area and the nature of the wholesale water demand must be included to meaningfully describe the overall operation of the entire San Francisco water system.

San Francisco provides water delivery to thirty wholesale water customers in San Mateo, Santa Clara and Alameda counties. Many of the cities, agencies and other entities which receive wholesale deliveries from San Francisco fall under the reporting requirements of the Act and themselves will be providing separate reports to DWR. The specific programs and elements described in this report which effect the Water Department's retail customers do not describe, nor are they intended to direct the activities undertaken by the wholesale water customers.

DEVELOPMENT OF THE MUNICIPAL WATER DEPARTMENT AND HETCH HETCHY SYSTEM

Facilities

The present San Francisco water supply system evolved through the development of two separate water systems: the Spring Valley Water Company and the Hetch Hetchy Water and Power Project (Hetch Hetchy). The Spring Valley Water Company was established in 1858, developing a spring and several creeks into a local water system. It expanded over the years with the construction of Pilarcitos, San Andreas and

Upper and Lower Crystal Springs Dams on the Peninsula, and later with the development of the Pleasanton Well Field, the Sunol Filtration Galleries and the Calaveras Dam in Southern Alameda County.

Very early during San Francisco's development it was recognized that the local water resources would be inadequate to support a burgeoning metropolis and plans for importing water from the Sierra Nevada were born. In the late 1800s, the City decided to develop its own water supply system and culminated in the planning, financing and construction of Hetch Hetchy.

The construction of Hetch Hetchy began in earnest in 1914, and after almost 20 years of construction, and the acquisition of the Spring Valley Water Company by San Francisco, Sierra Nevada water began flowing into the Water Department's local distribution system. Through the operation of the two systems, San Francisco has been able to provide the residents of the city and its neighboring communities with an unfailing supply of pure, potable water from secure sources.

Since the 1930s, the major additions to the San Francisco's water system have been the raising of O'Shaughnessy Dam and the development of Lake Lloyd, the addition of additional pipelines across the San Joaquin Valley, and locally the construction of San Antonio Reservoir in Alameda County and the Bay Division Pipelines 2, 3 and 4. Other local projects included Crystal Springs Pipeline No. 3, Sunol Valley and San Andreas Filtration Plants, and the Crystal Springs Bypass Tunnel and Balancing Reservoir. Figure I-1 shows the major facilities of the San Francisco water system.

Service Area

San Francisco provides water to both retail and wholesale water customers. A population of over 2.3 million people within the counties of San Francisco, San Mateo, Santa Clara, Alameda and Tuolumne rely entirely or in part on the water supplied by San Francisco.

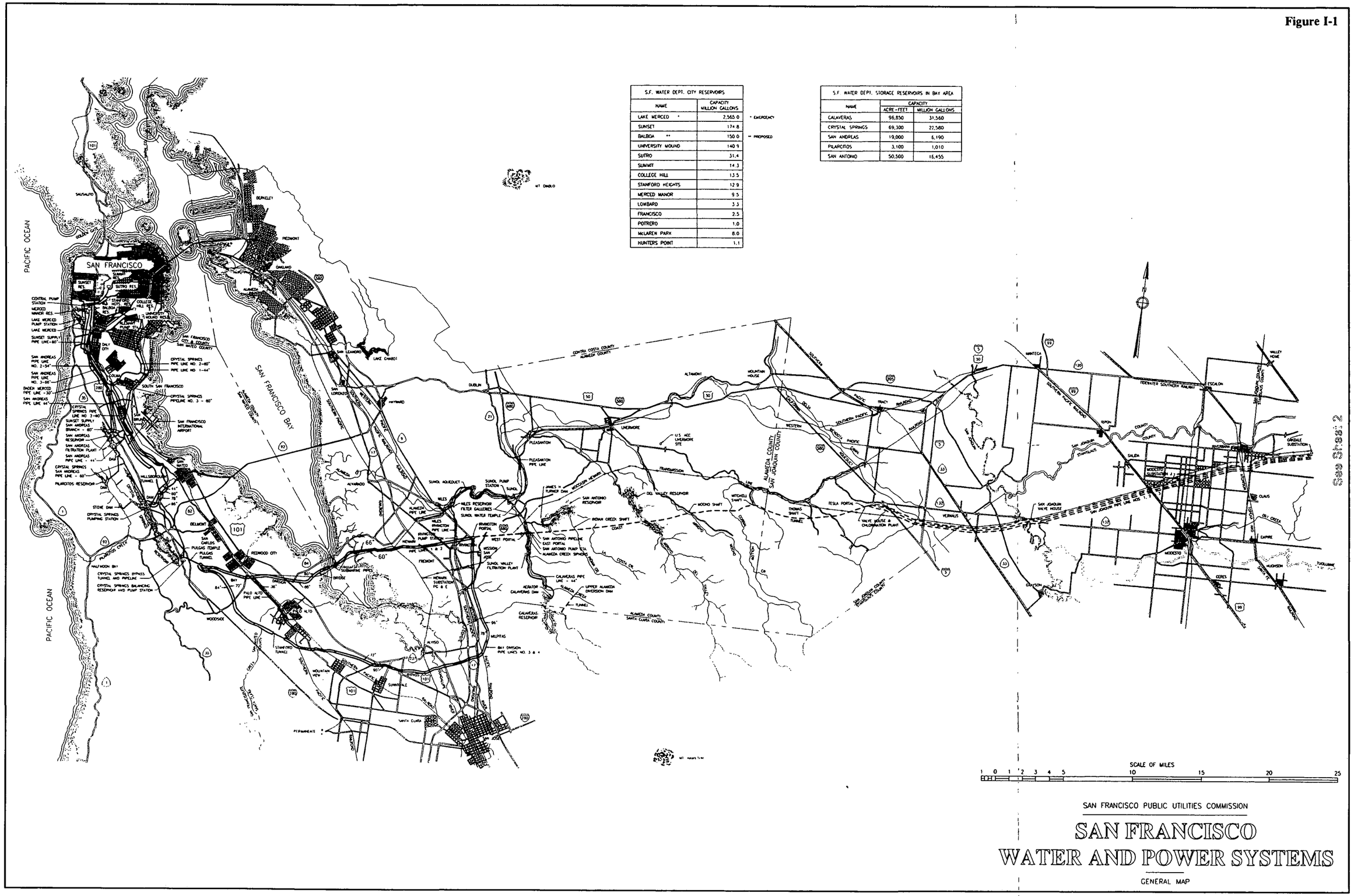
San Francisco's retail water customers include the residents, services and institutions within the corporate boundaries of the City and County of San Francisco who are served by the Water Department. In addition to these customers, retail water service is also provided to numerous other industrial, governmental and individual users in the Bay Area and Sierra Nevada foothills. These entities include the United States Navy, Town of Sunol, San Francisco International Airport, Groveland Community Services District, and Lawrence Livermore Laboratory.

The wholesale water customers of San Francisco are comprised of thirty entities which are served water under terms of the *Settlement Agreement and Master Water Sales Contract* together with individual water supply contracts. Since 1970, San Francisco has supplied approximately 65 percent of the total water demand of the wholesale water customers. Some of the wholesale water customers are entirely reliant on San Francisco for their water supply. Table I-1 lists the wholesale water customers provided water by San Francisco.

Figure I-1

S.F. WATER DEPT. CITY RESERVOIRS		
NAME	CAPACITY MILLION GALLONS	
LAKE MERCED *	2,565.0	* EMERGENCY
SUNSET	174.8	
BALBOA **	150.0	** PROPOSED
UNIVERSITY MOUND	140.9	
SUTRO	31.4	
SUMMIT	14.3	
COLLEGE HILL	13.5	
STANFORD HEIGHTS	12.9	
MERCED MANOR	9.5	
LOMBARD	3.3	
FRANCISCO	2.5	
POTRERO	1.0	
McLAREN PARK	8.0	
HUNTERS POINT	1.1	

S.F. WATER DEPT. STORAGE RESERVOIRS IN BAY AREA		
NAME	CAPACITY	
	ACRE-FEET	MILLION GALLONS
CALAVERAS	96,850	31,560
CRYSTAL SPRINGS	69,300	22,580
SAN ANDREAS	19,000	6,190
PILARCITOS	3,100	1,010
SAN ANTONIO	50,500	16,455



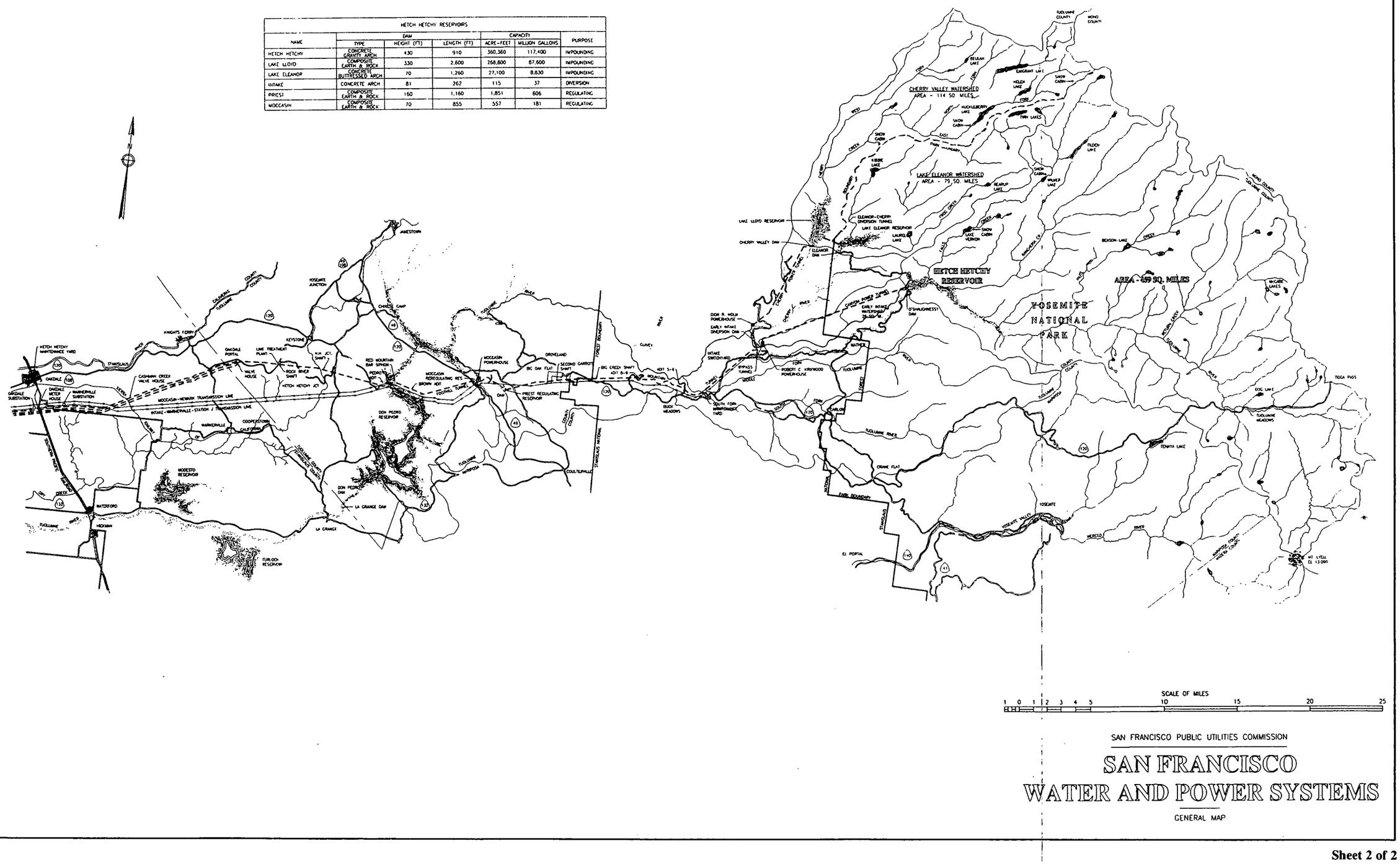
SAN FRANCISCO PUBLIC UTILITIES COMMISSION

SAN FRANCISCO WATER AND POWER SYSTEMS

GENERAL MAP

Figure I-1

HETCH HETCHY RESERVOIRS						
NAME	DAM			CAPACITY		PURPOSE
	TYPE	HEIGHT (FT)	LENGTH (FT)	ACRE-FEET	MILLION GALLONS	
HETCH HETCHY	CONCRETE GRAVITY ARCH	430	910	360,360	117,400	IMPOUNDING
LAKE LLOYD	COMPOSITE EARTH & ROCK	330	2,600	268,800	87,600	IMPOUNDING
LAKE ELEANOR	CONCRETE BUTTRESSED ARCH	70	1,260	27,100	8,830	IMPOUNDING
INTAKE	CONCRETE ARCH	81	262	115	37	DIVERSION
PRIEST	COMPOSITE EARTH & ROCK	160	1,160	1,851	606	REGULATING
MOCCASIN	COMPOSITE EARTH & ROCK	70	855	557	181	REGULATING



SAN FRANCISCO PUBLIC UTILITIES COMMISSION

SAN FRANCISCO WATER AND POWER SYSTEMS

GENERAL MAP

Table I-1 City and County of San Francisco Wholesale Water Customers	
Alameda County	
• Alameda County Water District	• City of Hayward
Santa Clara County	
• City of Milpitas	• City of Santa Clara
• City of Mountain View	• City of Sunnyvale
• City of Palo Alto	• Purissima Hills County Water District
• City of San Jose	• Stanford University
San Mateo County	
• City of Brisbane Water Department	• Coastside County Water District
• City of Burlingame	• Cordilleras Mutual Water Association
• City of Daly City	• East Palo Alto Water District
• Town of Hillsborough	• Estero Municipal Improvement District
• City of Menlo Park	• Guadalupe Valley Municipal Improvement District
• City of Millbrae	• Los Trancas County Water District
• City of Redwood City	• North Coast County Water District
• City of San Bruno	• Palomar Park County Water District #3
• Belmont County Water District	• Skyline County Water District
• California Water Service Company	• Westborough County Water District

PLAN ADOPTION, PUBLIC PARTICIPATION AND PLANNING COORDINATION

Plan Adoption

This updated Urban Water Management Plan was adopted by the San Francisco Public Utilities Commission in March 1996 and submitted to the California Department of Water Resources. This plan includes all information necessary to meet the requirements of the California Water Code Division 6, Part 2.6 (Urban Water Management Planning).

Public Participation

This plan received public hearing on March 12, 1996, and its availability was advertised as specified in California Government Code 6066. San Francisco has encouraged community participation in its urban water management plan and its plans for groundwater and recycled water.

Coordination Within the City

San Francisco coordinated the development of this plan among the Water Department, the City and County of San Francisco Department of Public Works, the San Francisco Fire Department and the Recreation and Parks Department,

particularly regarding San Francisco's proposed recycled water program and groundwater management plan.

Interagency Coordination

The San Francisco Water Department is overseen by the Commission. It is working with the Commission, other City departments and the Bay Area Water Users Association (representing the 30 wholesale agencies served by the San Francisco Water System) to create a *Water Shortage Contingency Plan* that will meet the needs of the entire system and the 30 wholesale agencies.

REPORT STRUCTURE

The structure of this report generally follows the outline of reporting requirements presented in the Urban Water Management Planning Act. The sections following this introduction respond to Section 10631 and Section 10632 of the Act and include:

Section II. Water Demands

This section presents information concerning past, current and projected water use including recycled water use. The estimated amount of water saved through water conservation measures is also described.

Section III. Demand-Side Management

Conservation and reclamation measures currently adopted and being practiced are described in this section. The schedule for implementation of conservation measures and methods to evaluate the effectiveness of measures are also discussed.

Section IV. Water Supplies

This section presents a description of San Francisco's water supplies and its plan for evaluating additional water supplies and programs to meet future water needs.

Section V. Water Shortage Contingency Planning

The plan for responding to future drought events is described in this section. The discussion is presented with a backdrop of the recent 1987-92 drought giving guidance to the development of a reasonable plan which will accommodate the many varied individual uses of San Francisco's water system.

II. WATER DEMANDS

Many factors affect the amount of water used by an urban society. These factors can include climate, the economic and demographic makeup of the population, the nature of industry and commerce in the area and the conservation ethic of the populace, be it learned or coerced.

The projections of water demands presented in this report are partially reliant on population and business trends forecast by the Association of Bay Area Governments (ABAG). ABAG's projections are used in combination with an analysis of the characteristics of water use in the San Francisco retail service area.

ABAG provides an important service to the San Francisco Bay Area with its periodic projection of regional economic and demographic conditions. Considerable effort is required when making these types of projections on a regional and subregional basis, including collection of basic data, development of forecast tools and the review and acceptance of projections. ABAG collects land use development plans, policies and regulations affecting land use from local governments including city, county and service districts. These data are compared and reconciled in order to provide a consistent data base for projections on a subregional and regional basis. These data become the basis for employment and demographic projections.

ABAG computes its employment and demographic projections using sophisticated models which have been developed for the nine-county area that comprises the San Francisco Bay Area. Employment models, for example, take into consideration interactions between neighboring counties or among economically related business sectors when determining employment projections on a subregional basis. The final step of ABAG's process consists of lengthy local participation and review. ABAG repeats this process and publishes its results on a biannual basis.

The San Francisco retail water demand has been forecast utilizing the most recent ABAG projection of Bay Area economic and demographic conditions. The report titled *Projections 96, Forecasts for the San Francisco Bay Area to the Year 2015* represents the expected or most likely growth outlook for the Bay Area.

General observations and findings reached by ABAG regarding regional area economic trends include:

- *"Both the Bay Area and California are still recovering from the recent economic slowdown."*
- *"While the Bay Area's economy is strongly tied to the high technology sector that is leading the national economic recovery, ... 'jobs recovery' has lagged."*
- *"Alameda and Santa Clara [county] will take until 1997 to fully recover [jobs lost since 1990]."*
- *"San Francisco will not equal its 1990 job total until 1999."*

Regarding demographic trends, ABAG highlighted the following findings:

- *"... the population of the City and County of San Francisco is now estimated to be 759,900. ... is expected to peak in 2010 at 800,600 and decline slightly by 2015 to 795,800."*

- *"Much of San Francisco's housing unit potential, ... is derived from the expected redevelopment of commercial and industrial land."*

This section primarily focusses on the projection of San Francisco's retail water demands. These demands are based on the recent ABAG information and a detailed analysis of San Francisco retail water use characteristics, including the effect of conservation measures. A brief discussion is also included concerning the projection of the wholesale water demand which affects San Francisco's water system operation.

RETAIL WATER DEMANDS

Demographic and Economic Trends

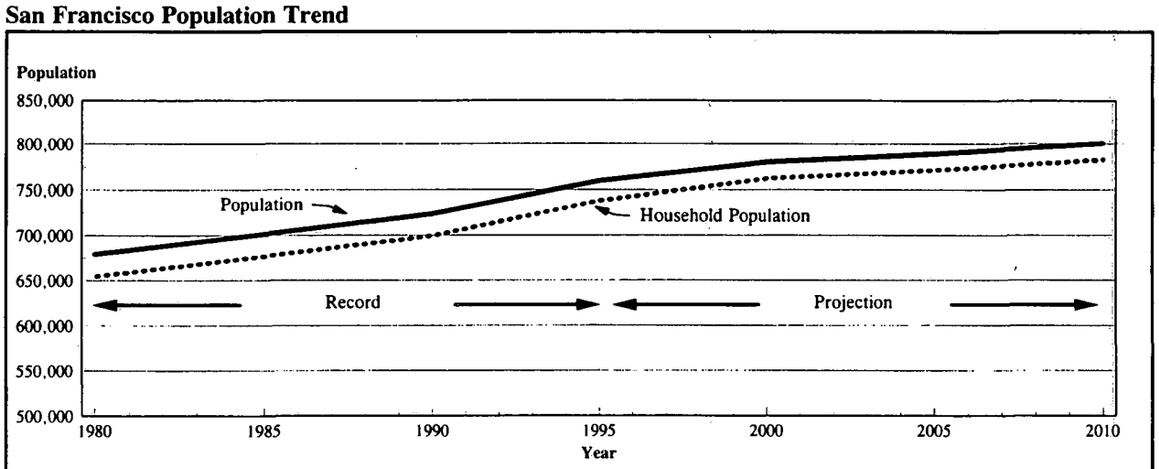
Population. The current population of San Francisco is estimated to be 759,900 and projected to increase to 800,600 by the year 2010. This increase amounts to an annual growth rate of approximately 0.35 percent for the next 15 years. Thereafter, the population within San Francisco is forecast to decline slightly due to assumptions regarding the aging of the populace and an expected decline in average household size.

The current population is San Francisco's highest since the 1950 Census when it was recorded as 775,400. The historical and projected population of San Francisco is shown in Figure II-1.

Households, Household Population, and Household Size. San Francisco projects water use within its residential sectors using factors such as household population (all persons living in individual housing units, not including persons who reside in places such as nursing homes, military facilities or rooming houses), households (occupied dwelling units) and household size (the household population divided by the number of households). These factors are important when projecting water use which is based on end-use of water within households.

A summary of population and housing trends for the 1980 through 2010 historical and forecast period is shown in Table II-1. ABAG commented that the large increase in the persons per household from 1980 to 1995

Figure II-1
San Francisco Population Trend



Population projection from ABAG, 1995.

Table II-1 San Francisco County Demographic Projections						
Demographics	**1980**	**1990**	**1995**	**2000**	**2005**	**2010**
Population	678,974	723,959	759,900	780,400	789,100	800,600
Household Population	654,511	699,330	738,100	762,500	771,700	783,000
Households	298,956	305,584	311,430	317,730	325,600	333,200
Persons Per Household	2.19	2.29	2.37	2.40	2.37	2.35
Single-family Units		105,521	106,722	107,100	108,000	108,800
Multi-family Units		200,063	204,708	210,630	217,600	224,400

was rationalized to occur due to the cumulative effect of the increasing high cost of living in the Bay Area and the economic recession. These factors are hypothesized to have concentrated more persons within housing units.

Industrial and Commercial Businesses. The recent recession significantly impacted the number of employed in San Francisco. While the number of jobs increased during the 1980s, between 1990 and 1993 ABAG estimates that San Francisco lost approximately 39,000 jobs.

A slow recovery appears to have begun in terms of job growth in San Francisco; however, ABAG projects it will take until about 1999 before San Francisco regains the jobs it lost since 1990. San Francisco's total share of Bay Area jobs is expected to continue to decline due to job decentralization. The historical and projected number of people employed in San Francisco has been developed by ABAG, and is shown in Table II-2. The values have been delineated by job sectors as classified by Standard Industrial Classification (SIC) code.

The majority of the job growth between now and the year 2010 is anticipated in the services sector. The jobs include hotel services, health services and business services. The remainder of the growth is associated with the return of jobs to the levels experienced prior to the recession.

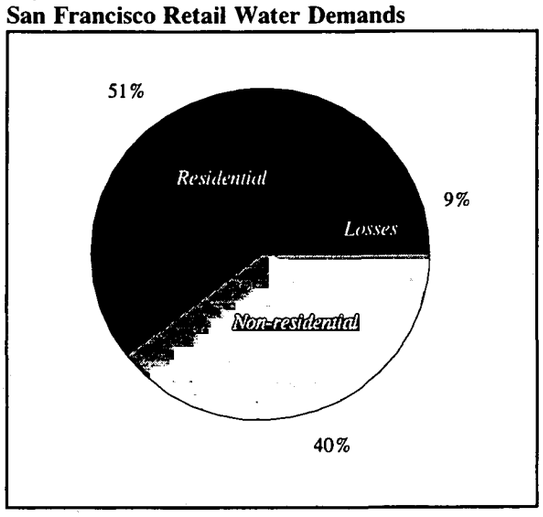
Table II-2 San Francisco County Number of Jobs in Industrial and Commercial Businesses						
Job Sector Category	**1980**	**1990**	**1995**	**2000**	**2005**	**2010**
Agriculture Services and Mining	3,302	2,250	2,120	2,170	2,160	2,080
Construction	24,070	16,000	14,630	17,660	19,270	17,830
Manufacturing	48,772	38,920	38,640	40,700	41,170	41,370
Transportation and Public Utilities	66,072	39,420	38,080	41,010	40,300	42,590
Wholesale Trade	22,745	29,900	22,960	25,090	26,700	24,950
Retail Trade	69,339	78,380	72,510	75,180	79,070	82,330
Finance, Insurance and Real Estate	85,343	73,770	68,200	68,220	70,230	74,030
Services	171,895	224,510	221,000	240,000	261,350	277,640
Government	60,662	63,490	56,470	57,890	59,880	60,280
Total	552,200	566,640	534,610	567,920	600,130	623,100

Water Use Characteristics

Water use within San Francisco is currently less than the level of water use experienced in the 1940s. Many factors have contributed to this reduction in water use including significant changes to the mix of industrial and commercial businesses and its associated water demand, and the general characteristics of water use by San Francisco water customers. In particular, the droughts of 1976-77 and 1987-92, and the conservation programs either voluntarily embraced by residents and businesses or mandated by San Francisco, have apparently affected water demands.

Total water use by San Francisco retail customers is estimated to be currently 90 million gallons per day (mgd). Approximately 51 percent of this total is delivered to San Francisco residential customers. Non-residential water use accounts for approximately 40 percent of the demand with the system losses accounting for approximately 9 percent (Figure II-2).

Figure II-2
San Francisco Retail Water Demands



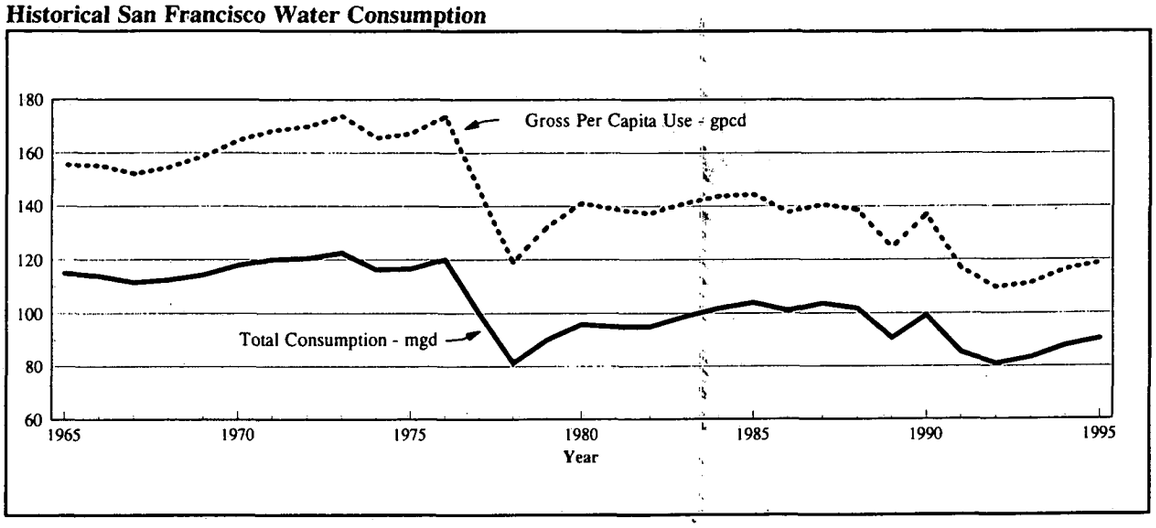
Not only has the absolute consumption of water declined in San Francisco, but so also has the per capita use of water. Figure II-3 shows the historical record of retail water deliveries by San Francisco for the 1965 through 1995 period in terms of both total deliveries and gross per capita consumption (gallons per capita-day, gpcd).

While the gross per capita consumption is not a true measure of the water used by an individual (since it includes water use by all categories of customers, e.g., industrial, commercial and losses), it does provide insight when comparing water use among regions. The current gross per capita consumption rate of water by San Francisco retail water customers is 119 gpcd.

Residential Water Use. Single-family units comprise approximately 34 percent of the total households in San Francisco, and use approximately 39 percent of the total water delivered to the residential sector. The remainder of residential water use (61 percent) occurs from multi-family units such as apartments and townhouses.

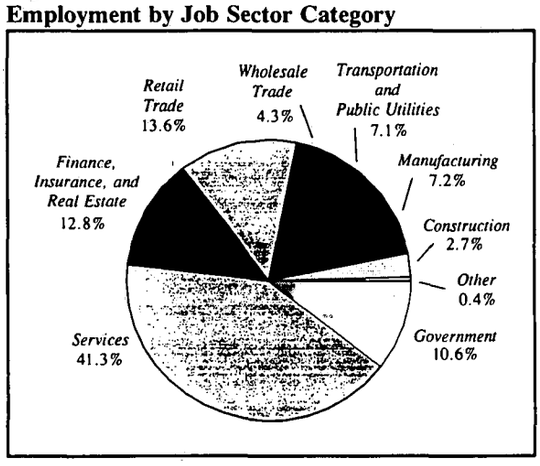
Combined, the single-family and multi-family residential sectors have a current per capita consumption rate of 60 gpcd. Due to the climate of San Francisco and the density of housing, water use within the residential sector is almost entirely for indoor water needs. For multi-family units, the average sector-wide outside water use is negligible. For single-family residential units, on average, outside water use is less than ten percent of their total use.

Figure II-3
Historical San Francisco Water Consumption



Non-residential Water Use. Non-residential water use accounts for approximately 40 percent of San Francisco's retail water demands. This category of water use includes all sectors of water users not designated as residential and includes manufacturing, transportation, trade, finance, and government employment sectors, and the large services sector. Figure II-4 illustrates the current distribution of jobs among the various employment categories within San Francisco.

Figure II-4
Employment by Job Sector Category



Average employee-use rates (gallons per employee-day, GED) have been estimated for the various employment categories. These values range from approximately 19 GED for the very small construction employment category to approximately 79 GED for the manufacturing employment category.

Projected Water Demands

San Francisco uses disaggregated water use forecast models to project its retail water demands. San Francisco's water demand is segregated into three distinct categories of water use: non-residential (representing industrial and commercial business water uses); multi-family residential (representing water use within multiple family dwellings such as townhouses and apartments); and single-family residential (representing water use within single-family dwellings). The remainder of San Francisco's water demands such as system losses and minor uses such as docks and shipping are forecast by trend analysis.

Non-residential water use is estimated using relationships between employment

within San Francisco and employee-use of water. These relationships are segregated by type of business or service enterprise based on SIC groups. The determination of appropriate employee-use rates within San Francisco's model included significant review of industry literature.

Two separate use models estimate multi-family and single-family residential water use. These models rely on a delineation of household end-use of water, such as the number and volume of toilet flushes, duration of showering, and the size and frequency of use of washing machines and dishwashers. Data from residential end-use monitoring studies were applied in each of the residential water use models.

The models have been verified with water delivery records for historical periods, including periods of time when water demands were affected by drought induced rationing programs. Water use projections through the year 2010 were developed using these models, and incorporated assumptions for market penetration of long-term conservation programs.

Projected Demands. Projected water use by San Francisco's retail customers has been estimated using San Francisco's water use models. These models have incorporated economic and demographic forecast data developed by ABAG which includes the projection of population, housing units and employment in San Francisco.

Also incorporated into the forecast models is the anticipated change in water use within the residential and non-residential sectors due to conservation programs implemented within San Francisco. These programs are consistent with the *Memorandum of Understanding Regarding Urban Water Conservation in California*, which San Francisco signed in 1991. This document committed San Francisco to the evaluation and implementation of numerous long-term conservation measures which are referred to as Best Management Practices (BMPs).

Results of the water demand forecasts show that San Francisco's retail water demand will only slightly increase by the year 2010 (Table II-3). Demands are projected to increase from approximately 90 mgd (1995) to approximately 92.5 mgd by the year 2010, an annual increase of 0.18 percent for the next 15 years.

The projected increase in retail water demands is due to estimated growth in business and industry activity with a commensurate increase in water use. The increase in water use within these sectors is forecast to be partially offset by decreases in water use within the residential sectors.

The forecasted water demands of both the single-family and multi-family residential sectors are projected to be less than current demands. This circumstance occurs as a result of projections that 1) population density within housing units will decline in the future, and 2) market penetration of conservation measures within the residential sectors will increase as time progresses. In tandem, these two factors will lead to less water use by a slowly increasing population.

Effect of Conservation Measures. The previously described water use forecast incorporates the anticipated effect of existing long-term conservation programs implemented by San Francisco.

Table II-3 Projected Water Demands (mgd)				
	Year			
Entity	**1995**	**2000**	**2005**	**2010**
In-City Customers				
Single-family Residential	17.7	17.6	17.1	16.8
Multi-family Residential	27.9	27.8	27.8	27.7
Non-residential	29.5	30.9	31.8	32.8
Other (Builders & Contractors, Docks & Shipping)	0.2	0.2	0.2	0.2
Sub-Total	75.3	76.5	76.9	77.5
Unaccounted-for Water (losses)	7.0	7.0	7.0	7.0
Total	82.3	83.5	83.9	84.5
Other Retail Customers and HHWP Customers				
Other Retail Customers Served by Water Department	5	5	5	5
Groveland Community Services District	1	1	1	1
Lawrence Livermore Laboratory	1	1	1	1
Sub-Total	7	7	7	7
Conveyance Losses	1	1	1	1
Total	8	8	8	8
Total Potable Water Demands Served by San Francisco	**90.3**	**91.5**	**91.9**	**92.5**
Water Demands Served with Non-potable Water				
Sunol Area/Castlewood	2	2	2	2
Golden Gate Park	1	1	1	1
Lake Merced Area	1	1	1	1
Total	4	4	4	4
Other Water Demands within City Limits				
Presidio (Not anticipated to be served by City)	2	2	2	2

An analysis was performed to estimate the water savings attributable to long-term conservation efforts that have resulted from voluntary customer efforts and the on-going programs implemented by San Francisco. The analysis incorporated assumptions for water use practices that existed prior to the 1987-92 drought. With the same economic and demographic data use for the current forecast, water demands were again determined.

Results of the analysis (Table II-4 and Figure II-5) show that without the effects of long-term conservation programs the retail water demand of San Francisco would be 10.2 mgd (11 percent) higher than currently experienced and would be 16.4 mgd (18 percent) higher by the year 2010.

Sensitivity of Demand Forecast. The current forecast of San Francisco retail demands relies on numerous assumptions regarding economic and demographic parameters, water use habits and the anticipated effects of long-term conservation measures. In total, the current forecast represents a "best estimate" of water use in the future.

Several uncertainties still exist regarding the future water use habits of the populace. During the drought, although somewhat minor in effect, outside water use within the single-family residential sector decreased

dramatically and has not yet returned to pre-drought levels. Whether this water use will rebound to pre-drought levels or remain as currently experienced is unknown, but could result in a one to two percent increase in water demands.

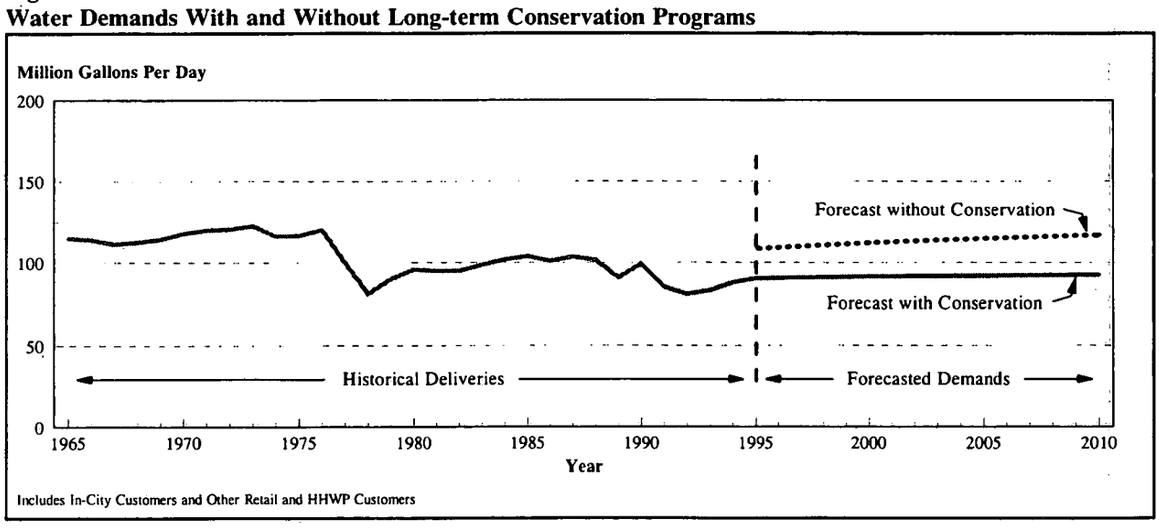
Possibly most significantly affecting the demand forecast are the economic and demographic forecasts. The immediately previous ABAG projection (1993) of population and business growth essentially forecast comparable levels of parameters to occur five years prior to the horizons now projected.

The five year delay in economic and population growth recovery results in very nearly a comparable five year lag in water demand levels. Should economic recovery accelerate faster than forecast, the growth in water demands will also accelerate. This circumstance may not significantly change the long-term projection of San Francisco retail water demands, but could change the growth rate of water demands to San Francisco from the wholesale water customers.

Table II-4
Projected Effect of Long-term Conservation Programs

	Reduction in Water Demands due to Conservation Programs (mgd)			
Forecast Sector	**1995**	**2000**	**2005**	**2010**
Single-family Residential	3.9	4.3	4.8	5.2
Multi-family Residential	4.4	5.9	6.6	7.4
Non-residential	1.9	2.4	3.5	3.8
Total Demand Reduction	10.2	12.6	14.9	16.4

Figure II-5
Water Demands With and Without Long-term Conservation Programs



WHOLESALE WATER DEMANDS

San Francisco provides water to thirty entities which comprise the wholesale water customers. These entities receive almost two-thirds of the total water delivered by San Francisco.

Although San Francisco does not specifically perform water demand forecasting of the wholesale water demand, coordination and exchange of information occurs between San Francisco and the wholesale water customers. This coordination normally occurs through the San Francisco Bay Area Water Users Association (BAWUA).

The most recent projection of water demands for the wholesale water customers originates from information developed for and provided to the Federal Energy Regulatory Commission (FERC) for its proceeding concerning San Francisco and the New Don Pedro Project on the Tuolumne River. That information and certain revisions form the basis for projecting the wholesale water demands included in this report.

Methodology Used to Project Wholesale Water Demands

The water demand projections for the wholesale water customers are, for the most part, a compilation of the projections made by the individual customers. Most of the customers developed projections for inclusion to their respective 1990 Urban Water Management Plans.

The basis of the projections used in this report is primarily underlaid with data provided by many of the wholesale water customers within their 1990 Urban Water Management Plans. BAWUA compiled this data and consolidated the numerous projections into a single water demand and supply projection for the group as a whole. BAWUA subsequently updated the water demand and supply projection based on annual surveys of the wholesale water customers. The most recent data which is incorporated into this report was developed as a result of the fiscal year 1992-93 annual survey.

Water Demands

The total water demands of the wholesale water customers were developed by customer class and are shown in Table II-5. The data shows that for the year 2010, water demands of the wholesale water customers (regardless of water source) will increase to approximately 297 mgd. This increase amounts to about a 16 percent increase over 1985 deliveries (approximately 13 percent when considering the offset of demand by reclamation). Both the 1985 and 1990 values are historically observed deliveries while the 1995 through year 2010 values are demand projections. The 1990 water deliveries include the effects of the 1987 through 1992 drought and the programs responding to water shortages.

Additional information was provided by BAWUA regarding the general characteristics of the wholesale water customers' water demand. Based on population projections made by the wholesale water customers, which BAWUA found to be very consistent with comparable Association of Bay Area Governments projections, the projection of population served by the wholesale water customers within the three-county area was made (Table II-6).

Table II-5 Wholesale Water Customer Total Water Demand (mgd)						
	1985	1990	1995	2000	2005	2010
Customer Class Demand						
Residential	136.1	120.0	146.3	155.6	163.8	171.1
Commercial	38.3	28.5	31.9	34.7	36.2	38.1
Industrial	39.8	28.0	30.6	35.8	38.0	39.8
Other	41.2	33.7	36.9	37.2	38.5	40.1
Subtotal	255.4	210.2	245.7	263.3	276.5	289.1
Reclaimed Water	0.0	0.5	3.9	6.2	7.2	8.1
Total	255.4	210.7	249.6	269.5	283.7	297.2

Table II-6 Population Served by Wholesale Water Customers						
	1985	1990	1995	2000	2005	2010
San Mateo County	618,600	655,200	681,300	697,000	709,300	722,300
Santa Clara County	400,900	418,900	451,400	471,600	488,500	505,600
Alameda County	341,300	381,300	412,200	434,300	459,100	466,100
Total	1,360,800	1,455,400	1,544,900	1,602,900	1,656,900	1,694,000

Table II-6 depicts a projected increase in population within the areas served by the wholesale water customers of approximately 25 percent between 1985 and the year 2010. Compared to the projected growth in water demands shown in Table II-5, a decrease in gross per capita water usage is projected for the wholesale water customers in comparison to pre-drought conditions. Table II-7 illustrates the historical and projected gross and residential sector per capita usage of potable water for the wholesale water customers.

The virtually flat residential per capita usage infers conservation savings in the residential sector. This inference is made since growth in that sector is anticipated to occur in portions of the service areas that have land use and climate that are conducive to higher water use than the current overall-use associated with the current water customers.

Water Supplies Other Than the San Francisco Water Supply

The wholesale water customers rely on San Francisco and to some extent other supplemental sources of water supply to meet water demands. These additional sources include groundwater, local surface water, the Santa Clara Valley Water District (Santa Clara) and the State Water Project. In a few cases, reclaimed water is also an additional source of water supply.

Although two-thirds of the wholesale water customers are entirely dependent on San Francisco for water, the other one-third of the customers are able to obtain some portion of their water from other sources. Table II-8 lists the sources of supply available to the entire group of wholesale water customers, although not all the sources listed are available to each customer.

Table II-7 Potable Water Use By The Wholesale Water Customers							
	1985	1990	1995	2000	2005	2010	Change*
Customer Class							
Potable Demand (mgd)							
Residential	136.1	120.0	146.3	155.6	163.8	171.1	25.7%
Commercial	38.3	28.5	31.9	34.7	36.2	38.1	-0.5%
Industrial	39.8	28.0	30.6	35.8	38.0	39.8	0.0%
Other	41.2	33.7	36.9	37.2	38.5	40.1	-2.7%
	255.4	210.2	245.7	263.3	276.5	289.1	13.2%
Population	1,360,800	1,455,400	1,545,000	1,603,000	1,657,000	1,694,000	24.5%
Per Capita							
Water Use (gpcd)							
Gross	188	144	159	164	167	171	-9.1%
Residential	100	82	95	97	99	101	1.0%

Note: *Change since 1985

Table II-8 Wholesale Water Customer Supplies Other Than San Francisco Supply (mgd)						
	1985	1990	1995	2000	2005	2010
Santa Clara[1]	11.5	14.8	19.0	18.6	19.0	20.0
State Water Project[2]	8.7	8.5	21.8	28.7	28.7	28.7
Groundwater[3]	58.7	50.9	44.8	42.9	47.0	51.4
Surface Water[4]	1.6	1.7	2.4	2.4	2.4	2.4
Reclaimed Water	0.0	0.5	3.9	6.2	7.2	8.1
Total	80.5	76.4	91.9	98.9	104.5	110.7

Notes: [1] Treated water deliveries only. Includes SWP and CVP imports.
[2] Only water treated by ACWD.
[3] Includes natural groundwater and SWP/CVP water recharged by the ACWD and the SCVWD.
[4] Non-SFWD.

The supply projections made by the wholesale water customers do not account for the variability in water supply hydrology associated with each source, nor do they incorporate the potential impacts of recent or pending regulatory decisions such as the State Water Resources Control Board 1995 Water Quality Control Plan for the Bay-Delta estuary, which may significantly impact the availability of water from the State Water Project and the federal Central Valley Project.

Wholesale Water Customer Water Demand On San Francisco

Comparing the total demands projected for the wholesale water customers with the other sources of water which are projected to be used by a number of those customers, Table II-9 depicts the wholesale water customer demand that will occur to San Francisco.

Table II-9 San Francisco Wholesale Water Customer Demand (mgd)						
	1985	**1990**	**1995**	**2000**	**2005**	**2010**
Total Wholesale Customer Demand	255.4	210.7	249.6	269.5	283.7	297.2
Other Supplies	80.5	76.4	91.9	98.9	104.5	110.7
San Francisco Wholesale Water Customer Demand	**174.9**	**134.3**	**157.7**	**170.6**	**179.2**	**186.5**

Several entities are projecting increasing reliance on supplies other than San Francisco to hold their San Francisco demands constant, or in some instances reduce their demands. If these other resources fail to materialize, then the group's water demands could be higher than projected.

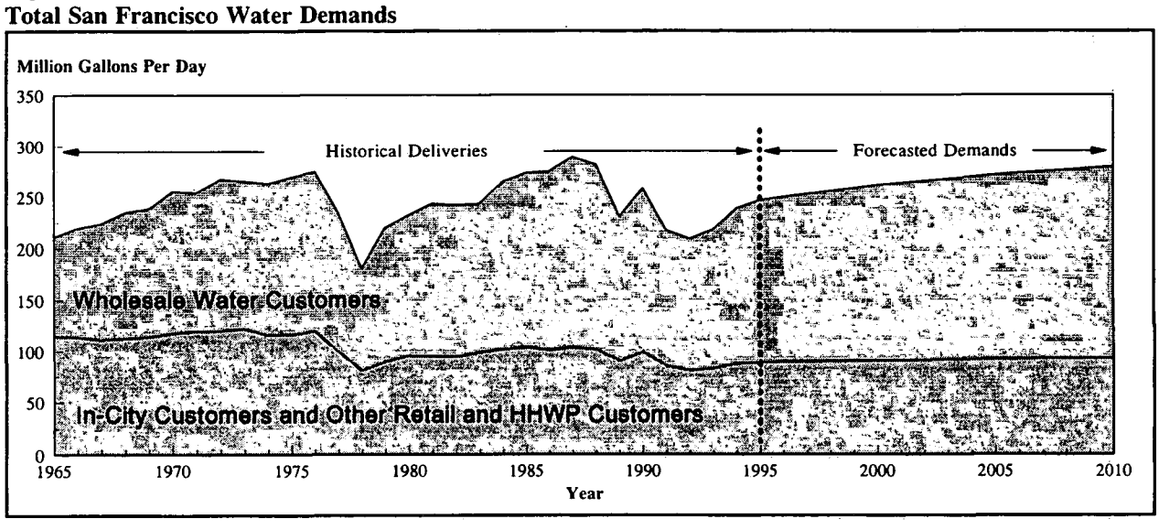
Variability of Wholesale Customer Demands

The water demands and supplemental sources of supply projected for the wholesale water customers are continually adjusting due to changing economic and demographic conditions within the service areas.

Although conservation has been incorporated into the water use projections, the effects of certain programs upon water usage are still uncertain.

The historical delivery of water and the projected demand of water to the wholesale water customers from San Francisco is shown in Figure II-6. It is projected that the water demand from the wholesale water customers will increase approximately 10 mgd every 5 years. Figure II-6 also depicts the demand for water by the wholesale water customers in combination with demands from all other San Francisco customers.

Figure II-6
Total San Francisco Water Demands



III. DEMAND-SIDE MANAGEMENT

San Francisco and its customers have a proven record of commitment to, and implementation of demand-side management programs.

The substantial decrease in water use which was induced by the 1976-77 drought is but the first example of significant changes to water use practices that can result in savings attributed to conservation programs within San Francisco. Gross per capita water use prior to and subsequent to the 1976-77 drought was 160 gpcd and 130 gpcd respectively, a decrease of almost 20 percent.

Despite growth in San Francisco since 1976, water demands have remained less than pre-drought levels. Subsequent to the 1987-92 drought, a second substantial decrease in water use within San Francisco has occurred. Although partially attributed to the effects of economic recession, a new level of conservation activities has resulted in water use savings that will continue into the future. Current gross per capita water use within San Francisco is 119 gpcd with residential water use calculated to be approximately 60 gpcd.

While San Francisco's low water use can be partially attributed to a cool coastal climate and relatively dense land uses, two other important factors contribute to San Francisco's efficient water use: distribution efficiency and demand-side management (conservation).

DISTRIBUTION EFFICIENCY

The difference between the amount of water produced or purchased by an agency and the amount recorded as sold at customers' meters is called "unaccounted for water." Some amount of loss in distribution is unavoidable due to necessary, but unmetered uses such as fire fighting and main flushing. A portion of a system's losses can be controllable.

San Francisco has an aggressive program to minimize the loss of water within its distribution system. Measures include regular investments in replacement of old, leak-prone mains with new pipe, systematic leak detection programs and regular meter calibration and repair programs. The result of these activities is a low unaccounted for water level within San Francisco - about six to nine percent of total water production.

DEMAND MANAGEMENT

The conservation ethic of San Francisco was demonstrated by the key role it played in negotiating and implementing the *Memorandum of Understanding Regarding Urban Water Conservation in California* (MOU) in 1991. Two years in the making, the MOU is a unique achievement in the field of water conservation.

As a result of the MOU, Best Management Practices (BMPs) were identified that all signatories agreed to implement. The BMPs describe actions and activities which encourage water conservation. The MOU recognizes the evolutionary nature of water conservation measures and makes provision for the removal or addition of BMPs as the technical and economic reasonableness of measures are

determined. Table III-1 lists the BMPs identified by the MOU.

The MOU also created the California Urban Water Conservation Council (CUWCC) which is charged with certain responsibilities and authorities, including but not limited to recommending study methodologies for BMPs, collecting and summarizing information on implementation of BMPs and making annual reports to the State Water Resources Control Board. San Francisco has been an active member of the CUWCC.

Signatories of the MOU are required to annually submit reports to CUWCC outlining progress toward implementing the BMP process. San Francisco's 1995 annual report to the CUWCC, which satisfies portions of the Urban Water Management Planning Act, is incorporated in this Urban Water Management Plan by reference and is submitted under separate cover.

A summary of San Francisco's progress with the BMPs follows. The description of San Francisco's water conservation activities is presented in a format following the BMPs listed in Table III-1.

Table III-1
Best Management Practices

No.	Practices
1.	Interior and exterior water audits and incentive programs for single family residential, multi-family residential, and governmental/institutional customers.
2.	Plumbing, new and retrofit:
	a. Enforcement of water conserving plumbing fixture standards including requirement for ultra low flush toilets in all new construction beginning January 1, 1992.
	b. Support of State and Federal legislation prohibiting sale of toilets using more than 1.6 gallons per flush.
	c. Plumbing retrofit.
3.	Distribution system water audits, leak detection and repair.
4.	Metering with commodity rates for all new connections and retrofit of existing connections.
5.	Large landscape water audits and incentives.
6.	Landscape water conservation requirements for new and existing commercial, industrial, institutional, governmental, and multi-family developments.
7.	Public information.
8.	School education.
9.	Commercial and industrial water conservation.
10.	New commercial and industrial water use review.
11.	Conservation pricing.
12.	Landscape water conservation for new and existing single-family homes.
13.	Water waste prohibition.
14.	Water conservation coordinator.
15.	Financial incentives.
16.	Ultra low flush toilet replacement.

Interior and Exterior Water Audits and Incentive Programs for Single-family and Multi-family Residential, and Governmental/Institutional Customers

San Francisco has provided an incentive program since the 1930s to single-family accounts which promotes the identification and repair of leaks. Bill adjustments are provided for circumstances where a leak, subsequently repaired, causes a high billing.

Since 1988, San Francisco has conducted water audits on 622 single-family accounts and 1,298 multi-family accounts.

San Francisco has developed a program that will specifically target the top 20 percent of water users in the multi-family residential sector. These customers have been notified by letter of an offer for a free water use audit. If the customer does not participate and remains on the target list, that customer will receive at least two additional letters offering an audit.

The conservation inspections are conducted by San Francisco's Conservation Inspector. During the audit, the inspector monitors the facility's meter, laundry area, water heater and plumbing fixtures. Depending on the size of the building, the inspector will then typically inspect 25-50 percent of all of the building's apartments or flats.

Outside water use conservation inspections are not normally required for multi-family accounts. Multi-family buildings in San Francisco typically do not have a landscaped area and outside areas are usually devoted to parking.

For each building, the inspector will create a checklist on needed repairs and give a copy of the checklist to the owner or manager. A formal written report is then returned to the owner or manager. Due to high demand for water audits, the inspector's schedule is usually booked for up to six to eight weeks in advance. At the request of the customer, the inspector will mark the building's or home's water shut-off valve for high visibility in case of an emergency.

San Francisco is planning to offer a similar program targeting the top 20 percent of its single-family sector water users beginning in 1996. During the audit, the inspector will monitor the customer's meter, water heater, plumbing fixtures and outdoor irrigation. Numerous audits are occurring at the request of single-family residential customers in response to billing questions, San Francisco's offer to mark main shut-off valves for high visibility, and the conservation rate incentive program.

Plumbing, New and Retrofit

Beginning with the adoption of *Ordinance No. 392-90* in late 1990, San Francisco began efforts to require customers to install water conserving devices. This ordinance changed San Francisco plumbing codes to require all new buildings (and all buildings where the water drainage system is substantially altered modified or renovated) to have installed toilets which use no more than 1.6 gallons per flush and urinals which use no more than 1 gallon per flush.

San Francisco followed-on to the "new construction" ordinance with a series of additional ordinances which would address conservation within existing dwellings. In May and September, 1991, San Francisco adopted *Ordinance No. 185-91* and *Ordinance No. 346-91*. Collectively these ordinances required water conservation device retrofit within multi-family and single-family residential buildings.

Upon sale, transfer of title, or major improvement to a dwelling:

- *Showerheads with a capacity not exceeding 2.5 gallons per minute must be installed,*

- *Aerators must be attached to sinks and basins where possible, and*
- *Flush reducers, flow restrictors, volume reducers, or toilets with a capacity not exceeding 3.5 gallons per flush must be installed.*

All applicable fixtures within multi-family residential units were to be retrofitted within three years subsequent to the effective date of the ordinances, essentially by the end of 1994.

The same plumbing retrofit requirements were placed on commercial buildings, including tourist hotels and motels, by *Ordinance 359-91* in September 1991. Within three years of passage of this ordinance, owners of commercial buildings were to have complied with the ordinance.

Compliance with these ordinances is accomplished through completion of inspection forms and the issuance of a certificate of compliance to the facility's seller. An additional incentive for compliance is occurring through a water pricing measure described later under the section titled Conservation Pricing.

At this time, San Francisco believes 89 percent of all private property in San Francisco is retrofitted to the above requirements. The Water Department, assisted by the Department of Public Works, has retrofitted all fixtures in approximately 65 percent of the municipal buildings in San Francisco. San Francisco's suburban retail customers outside of city limits are also required to retrofit their plumbing fixtures.

Distribution System Water Audits, Leak Detection and Repair

Since the 1970s, San Francisco has implemented a system-wide leak inspection and repair program to reduce distribution system losses. This program has contributed to the very low system losses previously described (six to nine percent).

Beginning in 1990, an innovative leak inspection program using advanced pitometer measurements and system zone analysis was instituted. Zones for inspection are selected for evaluation by factors including age of the water mains, results of previous measurements and the time since last evaluation.

San Francisco has stepped up its ability to identify leaks within its distribution system through use of sophisticated electronic equipment which can detect leaks from above ground. The equipment is able to differentiate between different noises under the ground including water flowing out of a pressurized pipe. Approximately one-third of San Francisco's distribution mains are surveyed per year.

Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections

All of San Francisco's retail customers are metered, and are billed by volume.

To promote efficient water use in new and renovated landscaping, *Ordinance No. 92-91* was passed in 1991. As one element of the ordinance, San Francisco requires irrigation meters for landscapes associated with any new or renovated building or site. Separate meters are required on all irrigated

park areas, median traffic strips, landscaped public areas, landscaped areas surrounding multi-residential and commercial developments, and industrial parks.

Large Landscape Water Audits and Incentives

Irrigation surveys have been conducted for 100 percent of San Francisco's large landscape customers, and for most sites at least two audits have occurred. The sites which are three acres or larger are predominantly owned and operated by the National Park Service and the San Francisco Department of Recreation and Parks. The surveys were conducted over the last three years, with a planned triennial cycle for additional audits. During the survey, the inspector calculates the evapotranspiration rate of the microclimates within the landscape area and does a survey of the irrigation system. San Francisco also offers yearly training seminars by local experts to these agencies' grounds keepers.

San Francisco is currently installing two California Irrigation Management Information System (CIMIS) weather stations at two of its properties. One of the sites is in San Francisco's largest residential neighborhood and the other is located at San Francisco's Water Department office in Millbrae, south of San Francisco. Daily climatological data including temperature, relative humidity, wind velocity and precipitation, will be made available on a telephone recording for the public to aid in irrigation scheduling.

In the past, San Francisco has offered grants for renovation of irrigation systems. A $40,000 grant to the San Francisco Department of Recreation and Parks was offered for renovation of its older irrigation systems. The grant covers only the cost of the equipment and materials. The Parks Department matches the grant by covering the cost of labor and consultants. The first grant was provided for a park that was using a water cannon irrigation method from the 1960s to irrigate its soccer fields. With the grant, the Recreation and Parks Department installed a low-impact, more efficient sprinkler irrigation system. San Francisco is currently gathering data to measure the effectiveness of this program.

In the coming year, San Francisco will contract with the *Green Ribbon Panel* to administer a water efficient landscape award for businesses within San Francisco. The award will go to three businesses which have created an attractive, yet water-efficient landscaped area for its customers and the public.

Landscape Water Conservation Requirements for New and Existing Commercial, Industrial, Institutional, Governmental, and Multi-family Developments

San Francisco *Ordinance 92-91* parallels the requirements of the Model Water Efficient Landscape Ordinance developed by the Department of Water Resources. Using a prescriptive approach, the requirements emphasize efficient irrigation equipment and techniques, limiting high water use areas, use of mulches, incorporating soil improvements and utilizing proper landscape design techniques.

San Francisco's ordinance effects all new development which involves the landscaping of an area greater than 1,000 square feet on a lot exceeding 3,500 square feet or the

creation by San Francisco of landscaping of an area greater than 1,000 square feet. As described previously, the ordinance requires separate water metering for certain landscaped areas.

San Francisco implements the plan review and site inspection process required by the ordinance through its Department of Public Works.

Public Information

San Francisco promotes water conservation through a variety of outreach efforts including brochures, public service announcements, bill inserts, direct mailings, bus shelter posters, "attention-getters", presentations and bill messages. An internet Home Page is being created by San Francisco and will be linked to San Francisco's Customer Service Division.

San Francisco sponsors various activities to reach out to the public with the message of conservation. One example is San Francisco's mobile *Environmental Booth*. Designed to look like a small house, the exhibit displays low-flow showerheads, retrofit devices for toilets, energy-efficient fixtures, and other water conservation and environmentally directed messages. The booth is taken to fairs throughout San Francisco and is staffed on a rotation basis by different San Francisco departments, including the Water Department.

The San Francisco Water Department also works with a local community group, the San Francisco League of Urban Gardeners (SLUG), to provide outreach to the community about water-efficient landscaping.

With funds from San Francisco, SLUG created and maintains a demonstration water-efficient garden in one of the San Francisco's residential communities. San Francisco also works with SLUG to create brochures and promotional materials on landscape topics such as irrigation maintenance, composting, mulching and water-efficient plants. In cooperation with SLUG, San Francisco recently created the brochure *Maintaining an Irrigation System* and is planning to jointly create a *Water Wise, But Beautiful Plants* brochure during the upcoming year.

Also concerning landscaping practices, San Francisco provides to local nurseries literature racks and brochures about various aspects of gardening that nurseries can pass along to their customers. San Francisco has been an exhibitor at the San Francisco Landscape Garden Show held in the spring of each year.

In addition to the brochures listed above, San Francisco has developed and maintains numerous other publications for public distribution:

- *Installing Retrofit Devices*
- *Apartment Residents, If You Don't Think You're Paying for Water ...*
- *Cash In On the Water Savings*
- *Water Conservation Checklist (Provided in English, Spanish and Chinese)*
- *Low-Flow Watering Systems*
- *Compost: The Inside Story (Provided in English, Spanish and Chinese)*
- *Water-Wise Gardening Basics*
- *Water-Wise Plants (Provided in English, Spanish and Chinese)*

- *Water Conservation: A Ten-Step Approach for the Business User*
- *How to Read Your Meter*
- *Mulching Matters*
- *Maintaining an Irrigation System*
- *Save Up to 20% with a FREE Audit*
- *Marking Your Shut-off Valve*
- *Water Conservation Guide*

To promote the toilet rebate program (described later), San Francisco used visual promotional items during the media campaigns for both programs. For the first program, San Francisco distributed miniatures of an old fashioned toilet with its press release for the rebate program. With its second campaign, San Francisco created a promotional item consisting of a roll of toilet paper wrapped in cellophane and stuffed with "play money." This second item received great attention from the media.

San Francisco has also been directly reaching the public with its billing process. On each bill the account's current average daily water usage is shown in comparison to its water usage during the same period in the previous year. This information is helpful for the public to recognize water use trends and possible cases of plumbing problems.

School Education

San Francisco works with the San Francisco Unified School District's Environmental Education Program, offering presentations to teachers and approximately 12,000 students each year about water and other environmental issues. San Francisco provides copies of its own student booklet, *Hetch Hetchy Water Magic* and its teachers' guide, as well as materials from the American Water Works Association, Water Education Foundation and other industry organizations. San Francisco has also created a two-piece map series of the Hetch Hetchy Water and Power System and San Francisco's Water Distribution System for teachers of upper elementary grades.

San Francisco held its first Water Festival in 1996 at a local community college. Over 1,600 elementary students from 42 different public and private schools participated in the event. Students were addressed by more than 50 speakers presenting information on water quality, wastewater treatment, wildlife habitat, fish and other topics. They were also able to experience hands-on, interactive exhibits and participate in water-related games and a celebrity-hosted trivia contest.

For the last six years, San Francisco has sponsored a calendar contest for fourth, fifth and sixth graders. Following the California Water Awareness Month's theme, the contest encourages students to think about water conservation. Last year San Francisco received over 800 entries and also opened the competition to students served by the system's wholesale water customers.

Commercial and Industrial Water Conservation

Similar to the program offered to single-family accounts, since the 1930s San Francisco has offered an incentive program to its commercial accounts which promotes the identification and repair of leaks. In addition to this on-going program, in 1993 and 1994 San Francisco specifically targeted the top 10 percent of its commercial and industrial accounts for a conservation audit

program. The top one percent of the commercial and industrial customers received both a letter and a personal phone call offering the free audit. The balance of the customers received at least one letter. Those customers who have not availed themselves of the free conservation audit will receive an additional two more offers.

Since 1989, San Francisco has conducted conservation audits on 715 commercial and 12 industrial accounts. During 1994 and 1995, San Francisco conducted a study on 357 commercial accounts that received conservation audits earlier in 1994. Results indicated an observed savings (possibly seven to 10 percent) in water use due to the customers' response to items found during the audits.

San Francisco's municipal and industrial water use audit program includes the review of the following items when applicable: plumbing fixtures, cooling towers, meter(s), laundry facilities, kitchens and or restaurants, public and private restrooms and boilers.

San Francisco is considering participation in the United States Environmental Protection Agency's (EPA) WAVE program which assists hotels in finding their optimal water efficiency in terms of maintenance, fixtures and plumbing practices. Findings are developed through the performance of several detailed audits and a software program developed and licensed by EPA. Thirteen of San Francisco's top 20 commercial accounts are hotels.

New Commercial and Industrial Water Use Review

Before receiving a certification of occupancy, all new commercial and industrial buildings must have an inspection by an inspector from the Bureau of Building Inspection that includes verification of water-efficient plumbing, recirculating cooling towers and other water efficient plumbing fixtures. These new buildings fall under the previously described ordinances for plumbing in new development. Approximately 40 new commercial and industrial buildings are inspected each year.

Conservation Pricing, Water Service and Sewer Service

To provide a strong incentive for customers to comply with conservation goals concerning water use devices, San Francisco has implemented a two-tier rate structure for its retail customers. Those customers who have retrofitted their plumbing fixtures and have filed an affidavit as to that action are billed at the "normal" rate per volume. Those customers that have not retrofitted their plumbing fixtures are charged a rate 50 percent higher than the normal rate.

In addition to unit rate charges, San Francisco addresses water use violations through its rate schedule. Violations of any water use restriction may result in the discontinuance of water service or the installation of flow restricting devices. The cost of these actions are borne by the customer.

San Francisco also provides an incentive for customers to reduce water use though its pricing of sewer service. San Francisco's sewer service is administered under the Department of Public Works' Clean Water Program.

Sewerage charges in San Francisco are billed by applying a sewerage rate times a fraction of a customer's water delivery. The rate for sewerage adds substantially to the cost of water use by San Francisco customers. The cost of sewerage to residential customers can quickly become three times the cost of water service and commercial sewerage charges are typically greater than three times the cost of water to the customer.

San Francisco's two-tiered rate structure, and the substantial sewerage charge, serve as a constant reminder to customers to conserve water.

Landscape Water Conservation for New and Existing Single Family Homes

San Francisco's programs concerning this category of BMP are previously discussed within the items relating to San Francisco's landscape ordinance and public outreach programs. San Francisco affirmatively attempts to promote landscape water conservation by the single-family residential sector.

Water Waste Prohibition

In 1993, San Francisco adopted a "No-Waste" ordinance. During the 1987-92 drought, San Francisco enacted numerous water use restrictions and prohibitions in response to the severe water shortage. These measures are enumerated in Section V of this report. With the ending of the drought in 1993, San Francisco decided to continue certain water use restrictions in furtherance of a long-term conservation program. These measures are listed below.

- *Avoidance of water waste, including but not limited to flooding or runoff into the sewers or gutters.*
- *Hoses used for any purpose must have positive shutoff valves.*
- *Restaurants shall serve water to customers only upon request.*
- *Decorative fountains must recycle water.*
- *Use of non-potable water for consolidation of backfill, dust control or other non-essential construction purposes is prohibited if other sources such as groundwater or reclaimed water are available and approved by the Department of Health.*
- *Water used for all cooling purposes and commercial car washes must be recycled.*

Violation of any water use restriction may result in the installation of a flow restricting device in the service line of the customer. Continued violation could result in termination of service. The customer bears the cost of any enforcement action.

Water Conservation Coordinator

San Francisco hired its first full-time water conservation administrator in 1986. The *Conservation Section* which resides within the Water Department has four staffed positions: the Conservation Administrator, a Conservation Inspector, a Water Conservation Clerk and a Toilet Rebate Coordinator. Almost all of the work of the Conservation Section, including the toilet rebate program, is done in-house. Responsibilities of the section also include

coordination and support functions for other departments within San Francisco.

Financial Incentives

Programs to facilitate conservation through financial incentive are described within the context of other listed BMPs. In summary, San Francisco's financial incentive programs include water and sewerage pricing and the next described program regarding toilet replacement.

One additional method employed to promote conservation is the use of San Francisco's *High Bill Inspection* process. If a customer feels that a bill is abnormally high due to a leak, an audit can be requested. If the recorded water use is found to be due to a leak and the problem is repaired quickly, the customer's bill may be adjusted.

Ultra Low Flush Toilet Replacement Program

San Francisco established a highly visible Ultra Low Flush Toilet (ULFT) rebate program in 1995. The rebate program is open to all residential customers and gives a rebate of $37.50 per toilet. In order to receive the rebate, a customer must purchase a toilet approved by the International Association of Plumbing and Mechanical Officials (IAMPO) and recycle the discarded toilet at an approved location.

Since San Francisco is a very urbanized with limited landfill space, San Francisco made provision for the discard of old toilets. The discarded toilets are crushed and used as filler, commercial aggregate and road base. To facilitate the recycling, San Francisco pays $4 per toilet to specified vendors.

Offered in January 1995, the first program sold out of its budgeted 8,000 rebates within ten working days. The second program, offered in September 1995, reached 7,000 rebates within three weeks. Most of the credit for the enormous response should be given to San Francisco's aggressive marketing program. San Francisco will be continuing this very successful program.

San Francisco also assists its own municipal departments in determining the benefits of conservation practices. In order to achieve goals for installing ULFTs within the commercial sector, San Francisco conducts cost-benefit analysis on municipal buildings for departments interested in installing ULFTs. The detailed analysis includes actual data gathered regarding the number of people using each of the building's toilets on two separate days. The study outlines the amount of money that a department can save on its sewer bill by replacing its toilets. It has been determined that most departments can receive a payback on their investment within 18 months by installing ULFTs in their buildings.

IV. WATER SUPPLIES

This section describes the various sources of water supply available to meet the water demands of San Francisco. San Francisco normally supplies almost all of its water deliveries from a combination of local Bay Area supplies and diversions from the Tuolumne River through Hetch Hetchy.

LOCAL WATERSHED PRODUCTION

Prior to the development of Hetch Hetchy, San Francisco served water demands with a combination of local Bay Area watershed runoff and groundwater. These sources continue to provide a significant portion of San Francisco's water supply during normal years (about 18 percent on average), but represent a very small portion of deliveries during periods of drought (approximately 6 percent during the recent 1987-92 drought).

On the San Francisco Peninsula, San Francisco utilizes Crystal Springs Reservoirs, San Andreas Reservoir and Pilarcitos Reservoir to conserve local watershed runoff. In the Alameda Creek watershed, San Francisco has constructed Calaveras Reservoir and San Antonio Reservoir. In addition to using these facilities to conserve runoff, they also serve to provide storage regulation between Hetch Hetchy diversions and water demands, and provide an emergency water supply in the event of an interruption to Hetch Hetchy diversions.

San Francisco serves its water demands with an integrated operation of local Bay Area water production and imported water from Hetch Hetchy. In practice, the local watershed facilities are operated to conserve local runoff. The water demands that are not met with local runoff require the importation of water from Hetch Hetchy.

Local area water production is dependent on precipitation and the ability of San Francisco to regulate watershed runoff. Based upon yearly runoff, the utilization of water from the local watersheds has varied from negligible to approximately 104 mgd.

GROUNDWATER

For the most part, groundwater aquifers within San Francisco are rated as inadequate by the United States Geologic Survey (USGS). Within San Francisco, a dichotomy exists between the eastern half of the city and the western half, with essentially no groundwater available in the eastern half and some development potential in the western half.

In the eastern half of San Francisco, the great majority of aquifers are less than 100 feet thick and nearly all are less than 200 feet thick. These aquifers consist predominately of low permeability dune sand, bay mud and clay. Besides constraints on groundwater development in this area from thin aquifers and low permeability, extensive groundwater contamination from nitrates and other constituents has been detected. Currently, some isolated use of groundwater by individual users occurs in the eastern portion of San Francisco for such non-potable purposes as laundry supply.

The western half of San Francisco has generally more favorable groundwater availability. Some areas exist where groundwater use has occurred historically. The primary areas of use are in the Golden Gate Park Area, the Sunset District, and the Lake Merced Area. These areas all have some areas where aquifer thickness is greater than 300 feet. Groundwater within these areas is typically used for such non-potable purposes as park irrigation, zoo supply, and golf course landscaping. This groundwater use has averaged slightly less than 2 mgd.

RECYCLED WATER (RECLAMATION)

San Francisco's experience with reclamation dates back to the early 1900s when the Golden Gate Park Area was transformed from 1,070 acres of "great sand waste" to a garden spot through the application of raw sewage and groundwater. In 1932, the Recreation and Park Commission constructed the McQueen Treatment Plant to provide secondary treatment, using an activated sludge process. This plant produced reclaimed water that was used to irrigate Golden Gate Park, fill its lakes, brooks and spillways, and recharge groundwater.

The McQueen Plant met State health requirements for the production of reclaimed water until new regulations were proposed in 1978. The advanced primary plant was shut down in 1981 when it failed to meet new health standards for irrigation use.

Additional efforts to expand the use of available secondary effluent quality reclaimed water began in 1989, when San Francisco built a secondary effluent truck loading station to distribute reclaimed water for soil compaction and dust control. The truck loading station has since been expanded and currently distributes reclaimed water to contractors, sewer maintenance and other wash down operations.

San Francisco Ordinance 175-91 requires that water used for dust control, consolidation of backfill or other nonessential construction purposes must be either groundwater or reclaimed water.

TUOLUMNE RIVER SUPPLY

Water developed by Hetch Hetchy represents the majority of the water supply available to San Francisco. During drought, the water received from Hetch Hetchy can amount to over 93 percent of the total water delivered. On average, Hetch Hetchy provides over 80 percent of the water delivered by San Francisco.

The amount of water available to San Francisco is constrained by hydrology, physical facilities, and the institutional parameters that allocate the water supply of the Tuolumne River. Due to these constraints, San Francisco is very dependent on reservoir storage to firm-up its water supplies.

On an annual basis, reservoir storage is used to conserve the water and power resources associated with Hetch Hetchy. This annual cycle regulates runoff so that hydroelectric power generation can be enhanced. More importantly though, reservoir storage provides San Francisco with year-to-year water supply carry-over capability. During dry years San Francisco has available a very small share of Tuolumne

River runoff and the local Bay Area watersheds produce very little water. Reservoir storage is critical to San Francisco during drought cycles since it enables San Francisco to carry-over water supply from wet years to dry years.

WATER DELIVERY CAPABILITY

The total amount of water San Francisco has available to deliver to customers during a defined period of time is dependent on several factors which generally reduce to a comparison of 1) the amount of water that is available to San Francisco from natural runoff and reservoir storage and 2) the amount of that water that must be released from San Francisco's system for commitments to purposes other than customer deliveries (e.g., releases below Hetch Hetchy reservoirs for prior rights and public trust purposes).

The recent 1987-92 drought profoundly highlighted the deficit between San Francisco's water supplies and its demands. Other than the 1976-77 drought, drought sequences in the past did not seriously affect the ability of San Francisco to sustain full deliveries to its customers.

The current "firm" delivery capability of San Francisco's water system has been determined to be 242 mgd, which is less than current demand. Therefore, San Francisco is faced with the necessity to develop a long-term strategy to accommodate or rectify the potential of future water shortages.

POTENTIAL WATER SUPPLIES AND AN INTEGRATED RESOURCE PLAN

As an established major water supplier for the Bay Area region, San Francisco has a responsibility to secure and manage its existing supplies and plan for future needs. Given the existing circumstance that San Francisco's water supplies are less than current demands and that demand growth is anticipated, San Francisco and its customers must accept the challenge of an increasing gap between supplies and demands.

San Francisco has initiated efforts to explore and ultimately implement a long-term strategy for demand management, water system management and potentially water system development. The efforts will be structured to provide an integrated resource plan (IRP) which will help select an acceptable resource and action strategy that will achieve reliability goals in a cost-effective, environmentally sound manner.

Although only in the initial scoping phase, San Francisco's planning effort will build on previous efforts and directives regarding alternative resource development, reliability analysis and conservation activities. Several of the potential resource options which will be evaluated are described below.

Groundwater

In 1991, the San Francisco's Board of Supervisors passed Article 22, the Recycled Water Use Ordinance (Ordinances 390-91 and 391-91). These ordinances mandated the

development of recycled water for maximum beneficial use wherever possible. The ordinances followed several earlier resolutions (Resolution No. 389-89 and Resolution No. 612-91) that recommended the expanded use of groundwater and the development of comprehensive, regional programs for additional wastewater reclamation, groundwater usage and conjunctive use within the service area.

The Water Department completed a Preliminary Draft *Groundwater Master Plan* in September 1995 that summarizes its plans to evaluate, manage and develop its groundwater resources and to integrate the potable and non-potable use of groundwater for the benefit of its customers.

The plan identifies specific actions to be conducted by San Francisco during the next five years and outlines broader strategies for the next 20 years. Five goals have been identified to frame an approach to managing, developing and using San Francisco's groundwater:

- *Protect and enhance groundwater quality*
- *Coordinate groundwater use*
- *Protect and conserve related water resources*
- *Improve ability to deliver water during emergencies*
- *Maximize groundwater use*

The final plan will include an environmental review conducted during 1995-96. This environmental impact report (EIR) will take place on the programmatic level and the project level, and include public review.

Approximately 2 mgd of San Francisco's average daily water demand is supplied by groundwater for non-potable uses. Most of this groundwater is produced and used by the San Francisco Recreation and Parks Department.

Although there may be some potential for limited additional development in the western portion of San Francisco, considerations of sea water intrusion and potential toxics contamination may restrict additional usage. The ultimate potential for groundwater development in San Francisco probably lies somewhere between the current usage and the USGS-estimated natural recharge of 4.3 mgd.

Additional usage of the groundwater aquifers as conjunctive use basins for drought supplies is also being considered within the groundwater master plan.

Recycled Water

San Francisco Board of Supervisor's Ordinances 390-91 and 391-91 outlined specific components to be addressed in the Recycled Water Master Plan, and defined recycled (or reclaimed) water use areas within San Francisco. Phasing of the implementation of reclaimed water projects was to be based on 5-year increments, with reclaimed water provided to designated use areas within 10 years. The ordinances require dual plumbing system installation within the non-potable water use areas for the following situations:.

- *New or remodeled buildings and all subdivisions (except condominium conversions) with a total area of 40,000 square feet or more*
- *New and existing irrigated areas of 10,000 square feet or more*

A draft *Recycled Water Master Plan* describing the implementation of a City-wide reclamation program was released in September, 1995 (RWMP). The program was developed to meet the following objectives:

- *Maximize City-wide recycled water use while keeping costs reasonable*
- *Improve water supply reliability for the City, particularly during drought periods*
- *Improve reliability and expand the fire protection system within the City*
- *Preserve the high quality Hetch Hetchy system water supply for potable uses*
- *Coordinate management of the City's water supply resources, including surface water, groundwater, and recycled water*

The draft plan identified a phased water reclamation project that would initially provide within San Francisco an estimated 6,100 acre-feet per year (AFY) of recycled water for non-potable and potable use and potentially up to 11,500 AFY by 2011.

Of the initially available recycled water, it is estimated that approximately 2,700 AFY will replace potable water currently being delivered. The amount of recycled water that will ultimately replace future projected potable water demand is estimated to be up to 5,200 AFY.

Potential Uses of Recycled Water. Various survey and outreach efforts were conducted to identify potential uses and users of recycled water. Potential users expressed concerns about issues dealing with public health and potential impacts to sensitive landscaping.

With the results from these efforts, a list was created of potential users of the project's recycled water, including San Francisco's major urban irrigation areas (parks, golf courses and schools), commercial centers and industrial users. Landscape irrigation represents the project's largest potential use (72 percent).

The RWMP notes that the best alternative for distributing the recycled water is through the San Francisco Fire Department's Auxiliary Water Supply System (AWSS). San Francisco is one of the few cities in the nation that has a separate water system for use in fire protection. San Francisco's reclamation program will provide expansion of its vital fire protection service with thirty-four miles of new pipeline and 600 hydrants while using the system to distribute the recycled water.

Marketing and Financing Strategy. The recycled water project has been structured in phases. As with all municipal projects, funding is limited, and the phased approach allows flexibility in constructing and implementing this project. San Francisco is currently proceeding with the evaluation of financial options and a public education and outreach program for the first phase of the RWMP. The intention of San Francisco is to prepare a bond report suitable for placing Phase I of the RWMP before the voters in 1997.

Economic Considerations. The estimated capital cost for the project is $194 million (1999 cost). The costs are based on planning-level estimates (approximately $\pm$ 30%). The total annual cost for operations and maintenance is estimated to be $4 million per year with an annual recycled water delivery of 11,500

AFA. Costs of the multi-purpose recycled water use project will likely be repaid by various project beneficiaries.

Reservoir Storage/Conjunctive Use

San Francisco's full utilization of its entitlements to surface water supplies is partially constrained by the physical limits of its reservoirs and conveyance and treatment system. Options that include additional or modified structures will be considered. These options may be the enlargement or development of additional storage reservoirs (either traditional reservoirs or groundwater aquifer reservoirs) and appurtenant conveyance facilities.

Water Purchases

In addition to more fully developing its existing water supplies, San Francisco will consider options that incorporate water purchases as a supplemental supply. These options may or may not require new or modified facilities to implement.

Conservation and Drought Water Management

Although not considered a "resource" option, conservation and drought water management will be considered within the IRP process as an integral component.

V. WATER SHORTAGE CONTINGENCY PLANNING

Every water system has vulnerabilities in terms of its ability to provide a safe and reliable supply of water. Water shortages can occur in a number of ways. Very localized shortages can occur due to distribution system problems and system shortages may occur due to major facility failures. Yet, beyond system facility contingencies, there exists the potential vulnerability to drought which limits the amount of water that is available over a series of years. This later type of contingency is not necessarily caused by physical facility limitations.

This section primarily describes San Francisco's response to potential drought contingencies. As required by the Urban Water Management Plan Act a water shortage contingency plan is to be prepared that identifies what actions and programs will be undertaken in response to various levels of water shortage.

MANAGEMENT RESPONSE TO WATER SHORTAGE

The recent 1987-92 drought illustrated the deficit between San Francisco's water supplies and its demands. Other than the 1976-77 drought, drought sequences in the past did not seriously affect the ability of the San Francisco to sustain full deliveries to its customers. As the recent drought progressed and reservoir storage continued to decline, significant questions regarding how San Francisco would operate its water system came to bear:

- *How much water should the City maintain in storage at the end of one year to assure water deliveries during the next year?*
- *To what level can the City expect its customers to reduce water use?*
- *How long a period should the City expect the drought to continue?*
- *During that period, what water supplies should be expected to be available to the City for delivery?*

As San Francisco progressed into the recent drought, it became evident that full water deliveries could not be sustained without a risk of "running out of water" before the drought was over. This circumstance became a painful reality in early 1991 when Hetch Hetchy Reservoir became so depleted (less than 25,000 acre-feet of storage in a reservoir with over 360,000 acre-feet of capacity) that minimum fishery releases and anticipated demands required San Francisco to initiate programs to achieve a 45 percent reduction in system-wide water deliveries to balance water supplies with deliveries. Fortunately, unexpected runoff provided relief from the severity of that instance of water shortage; however, the drought was far from over.

San Francisco could not know how severe the recent drought would become. However, by necessity San Francisco operated under a general procedure relating water supply and deliveries. This procedure led to the implementation of water rationing during the recent drought. The procedure triggered different levels of rationing in relation to projected reservoir storage: less water in storage led to higher levels of rationing.

The procedure was developed to protect water customers from being subjected to

shortages in supply that could not be achieved by drought-related water demand reduction programs. The concept was to provide "drought water delivery protection." That is, some level of assurance that water would be delivered continuously during drought.

The 1987-92 Drought Experience

During the recent 6-year drought, the operational capabilities of Hetch Hetchy and the other water supplies available to San Francisco were taxed to a point that forced drastic actions to avoid running out of water. Certain of those actions were described in San Francisco's 1992 response to Assembly Bill 11x which required the preparation of a *Water Shortage Contingency Plan.*

By 1992, many of the programs and actions contemplated by the *Water Shortage Contingency Plan* had been implemented. The following describes some of the major actions that occurred.

Demand Reductions. The extended drought forced San Francisco to adopt a mandatory rationing program, enforced by stiff excess use charges and the threat of shut-off for continued violations of water use prohibitions. Mandatory rationing was in effect May of 1988 through May of 1989, re-instituted in May of 1990, and continued until March of 1993.

San Francisco's water rationing program was one of the toughest in the state and the most stringent imposed by any major urban water supply agency. Although the specifics of the program varied over time, the basic outline of the mandatory rationing program was to achieve a 25 percent reduction to 1987 (pre-drought) consumption (system-wide), with water allocations set on an account-by-account basis.

To provide a strong incentive for customers to use no more water than their allotment, San Francisco adopted a rate structure that incorporated excess use charges. Any customer that used less water than its allotment was charged the normal rate per unit of water consumption, while any customer who used more than its allotment was charged a multiple of the normal rate for every unit of consumption above its allotment. As of January 1, 1992 (the last year of the rationing program), the rate structure shown in Table V-1 applied to San Francisco customers.

Table V-1
Excess Use Charges

If Water Consumption Is (Over Allotment)	Excess Use Charge Will Be (Times Normal Rate)
Up to 10%	2
10.01 - 20%	8
20.01% or over	10

In the event that water was used in excess of the customer's specified allotment, San Francisco could, after one written warning, install a flow restrictor on the customer's service line. The charge to install and remove the restricting device is shown in Table V-2. If a customer continued to consume water in excess of its allotment, San Francisco had the authority to discontinue the customer's water service and require the customer to bear the cost for the re-connection of water service.

Table V-2. Fee For Installing Flow Restricting Devices	
Meter Size	Installation/Removal Cost
⅝" to 1"	$95
1½" to 2"	$149
3" and larger	Actual cost

In addition to pricing disincentives for excess water use, numerous water use restrictions were adopted and enforced. San Francisco retail customers were required to comply with the following water use prohibitions and restrictions:

- *Water waste, including but not limited to, any flooding or runoff into the street or gutters, was prohibited.*
- *Hoses could not be used to clean sidewalks, driveways, patios, plazas, homes, businesses, parking lots, roofs, awnings or other hard surfaces areas.*
- *Hoses used for any purpose had to have positive shutoff valves.*
- *Restaurants served water to customers only upon request.*
- *Potable water was not to be used to clean, fill or maintain levels in decorative fountains.*
- *Use of additional water was not allowed for new landscaping or expansion of existing facilities unless low water use landscaping designs and irrigation systems were employed.*
- *Water service connections for new construction were granted only if water saving fixtures or devices were incorporated into the plumbing system.*
- *Use of potable water for consolidation of backfill, dust control or other non-essential construction purposes was prohibited.*
- *Irrigation of lawns, play fields, parks, golf courses, cemeteries, and landscaping of any type with potable water would be reduced by at least the amount specified for outside use in the adopted rationing plan.*
- *Verified water waste as determined by the Water Department would serve as prima facie evidence that the allocation assigned to the water account is excessive; therefore, the allocation was subject to review and possible reduction, including termination of service.*
- *Water used for all cooling purposes was to be recycled.*
- *The use of groundwater and/or reclaimed water for irrigation of golf courses, median strips, and similar turf areas was strongly encouraged.*
- *The use of groundwater and/or reclaimed water for street sweepers/washers was strongly encouraged.*

In addition to water use prohibitions and directives specifically responsive to the drought, San Francisco coincidentally was implementing long-term conservation programs which would also lower water demands during the drought period (refer to Section III). Several of the measures described above were adopted by San Francisco into permanent, on-going programs.

San Francisco also assisted in the distribution of retrofit kits at community functions, and provided the kits upon request at the Water Department. These kits included a toilet volume displacement bag, plastic flow restrictors for use in showerheads and faucets, and leak detection tablets for toilets.

Water Management. In addition to effecting reductions to water demands, San Francisco also employed water management activities to control the severity of water shortages to its customers.

During the drought, for the first time in history San Francisco utilized a Delta supply within its system. San Francisco imported water from the Delta through use of State Water Project South Bay Aqueduct facilities. The sources of water transferred included re-transfers from the California Emergency Water Bank, Placer County and the Modesto Irrigation District. The waters were diverted from the South Bay Aqueduct to San Francisco's San Antonio Reservoir and then treated and integrated into San Francisco's water distribution system.

The amount of water actually delivered to San Francisco was constrained due to numerous factors including the lack of willing sellers, allocation procedures, lack of priority in use of State facilities, storage constraints in San Antonio Reservoir, and water treatment constraints within San Francisco's system. The total water that was imported into San Francisco's system amounted only to a maximum of approximately 31,000 acre-feet in one year, and in total for the drought period amounted to only 59,000 acre-feet.

The importation of additional water into San Francisco's system allowed the continuation of a 25 percent system-wide rationing program as compared to a potentially higher level of rationing had the transfers not occurred.

System Response and Effects. The system-wide goal of reducing water use by 25 percent was achieved. However, the reduction was not accomplished without cost or hardship.

To achieve its annual 25 percent system-wide rationing goal, San Francisco targeted a reduction of indoor consumption by 10 percent and outdoor consumption by 60 percent.

Due to the nature of the allocation formula for water allotments and the level of system-wide reduction goal, instances occurred where individual users or wholesale water customers were burdened with up to twice the system-wide average in delivery reductions.

Some of the costs incurred by individuals, property owners and renters have been financial.

- *The cost of installing low-flow toilets, retrofit kits for toilets and showerheads, and special low-water use landscaping and irrigation systems*
- *The financial losses resulting from loss of lawns, plants and trees due to the 60 percent reduction in water available for irrigation*
- *The cost of excess use charges ($12,300,000 in excess use charges was billed to retail accounts in fiscal year 1991-92 alone)*

The ability for customers to achieve a 25 percent reduction in the future is highly unlikely due to the "hardening" of water demands that occurred during and subsequent to the drought. The rationing programs implemented by San Francisco during the recent drought were measured by comparison to calendar year 1987 water deliveries, i.e., pre-drought conditions.

During the drought numerous conservation measures were implemented by San Francisco's retail and wholesale water customers that have led to permanent per capita water usage savings. Today's water demand is likely hardened as compared to the 1987 level of water demand. This situation leads to a conclusion that comparable rationing goals (e.g., up to 25 percent

reduction) would be more difficult to achieve since the drought, and would require measures in excess of those implemented during the recent drought to achieve a comparable percentage of delivery reduction.

As the level of rationing increases, the more severe economic and societal impacts will become. San Francisco has first hand experience with the attempt to employ rationing to levels which are intolerable to citizens and businesses.

In 1991, water storage had deteriorated and San Francisco was forced to immediately adopt a 45 percent system-wide rationing plan. It was proposed the reduction would be achieved through a 33 percent reduction to inside water use and a 90 percent reduction to outside water use.

San Francisco's plan for meeting its rationing goal included the following minimum and maximum criteria:

- *Maximum Allocation for Single and Multi-family Residences. No single-family residence shall receive an allocation of more than 300 gallons per day: no multi-family residence shall receive an allocation of more than 150 gallons per day times the number of living units in the building.*

- *Minimum Allocation for All Residential Accounts. A minimum of 50 gallons per day per documented resident will be allowed. However, a minimum allocation will not be approved to increase an allocation above current usage absent a documented change in circumstances.*

- *Irrigation Services. Accounts classified for irrigation only will be reduced by 90 percent.*

- *Commercial/Industrial Allocations. Commercial and industrial allocations will be reduced by 32 percent. Hospitals and other health care facilities may be subject to lesser restrictions subject to verification that all conservation measures are in place; such approval shall require an on-site conservation inspection.*

- *Allocations for New Accounts. Initial allocations will be established at 50 gallons per day. These allocations will be re-evaluated after customers have installed retrofit kits provided by the San Francisco Water Department. After verification of installation, allocations will be calculated on the basis of the number of documented residents within a household, or, in the case of commercial or industrial customers, on the basis of business data supplied to the Department.*

Additional water use restrictions and prohibitions were enforced:

- *The washing of all automobiles, motorcycles, RVS, trucks, transit vehicles, trailers, boats, trains and airplanes was prohibited outside of a commercial washing facility.*

- *Exceptions to the above use restriction were windows on all vehicles and such commercial or safety vehicles requiring cleaning for health and safety reasons.*

- *Water used for all cooling purposes or for commercial car washes had to be recycled.*

- *The use of potable water on golf courses was limited to the irrigation of putting greens. The use of groundwater and reclaimed water was permitted when approved by the Department of Health.*

- *The filling of new swimming pools, spas, hot tubs or the draining and refilling of existing pools, etc., was prohibited; topping off was allowed to the extent that the designated allocation was not exceeded.*

- *The irrigation of median strips with potable water was prohibited. The use of groundwater and reclaimed water was permitted when approved by the Department of Health.*

- *The use of potable water for street sweepers/washers was prohibited. The use of groundwater and reclaimed water was permitted when approved by the Department of Health.*

Public and commercial response to 45 percent rationing was overwhelmingly negative. During the first weeks after notification of the program, San Francisco received over 2,000 appeal letters per day. In the month before rationing was returned to 25 percent, 19,000 appeals, 12,000 telephone calls, and 1,500 walk-in complaints occurred.

Both the allocation levels and new prohibitions required to meet this level of rationing would have had a devastating effect on commercial enterprises. Some water uses would have simply been prohibited.

Simply put, rationing had been taken to a level which was intolerable to citizens and had become economically disastrous.

Long-term Drought Management Plan

In response to the 1987-92 drought and the requirements of the Urban Water Management Planning Act, San Francisco prepared a *Water Shortage Contingency Plan.* Currently this plan is being reviewed and updated. The factors and issues that will be addressed by the updated plan are briefly highlighted as follows.

Rationing Stages and Reduction Goals. The plan will identify physically-based, staged rationing levels to invoke during declared water shortages. At this time, it is anticipated that the plan will include voluntary and mandatory stages, depending on the causes, severity and anticipated duration of the water supply shortage, and the reasonable ability of customers to reduce water demands.

Priority by Use. Legal requirements set forth in the California Water Code, Sections 350-358 will be considered. These sections set priorities for use of available potable water during shortages. The plan will reflect this part of the Water Code and all other applicable legal requirements.

Health and Safety Requirements. As a water purveyor, San Francisco must provide enough water to meet the health and safety needs of its customers at all times.

Water Shortage Stages and Triggering Mechanisms. The plan will include staged levels of rationing corresponding to appropriate trigger indicators. These trigger indicators will likely reflect different reservoir storage levels within the water system.

Water Allotment Methods. This element may require the most attention within the plan. As discussed in this document, San Francisco created a mandatory rationing program that was implemented from 1988 into 1993. The allocation formula developed to achieve the system-wide rationing goal resulted in very different rationing requirements among San Francisco's customers.

San Francisco and the wholesale water customers formed a *Water Shortage Contingency Plan Task Force* to propose alternative methodologies for allocating water shortages during times of drought. This task force includes representatives from the Commission staff, the Water Department and the Bay Area Water Users Association.

The task force is evaluating a wide range of alternatives to apportion the impact of water shortages on the system's wholesale and retail customers. The task force will provide its alternatives to the wholesale

water customers and Commission staff for review and consideration. Ultimately, the San Francisco Public Utilities Commission will review and approve a plan for allocating shortages.

Mechanism to Determine Reductions in Water Use. Under normal water supply conditions, potable water production figures are recorded daily. However, water delivery values are collected on a much less frequent basis. The plan will include a method for monitoring and enforcing reductions in deliveries during water shortages.

Near-term Drought Management Plan

In the near-term during the completion of the long-term plan, San Francisco will assess and react to changing water availability conditions consistent with its historically established practices. These practices include the periodic assessment of water availability each year and a determination of need for water delivery reductions (rationing) or implementation of water management opportunities.

Water Availability Assessment. Each year San Francisco forecasts the amount of water that will become available for its use. This water includes runoff from the local Bay Area watersheds and runoff within the Tuolumne River basin. This forecast is updated periodically during the year and is fairly certain by early summer. The forecasted water supply is then compared to the anticipated water demands of San Francisco's retail and wholesale customers and other water obligations such as stream flow requirements below San Francisco's reservoirs. Also entering into this comparison are objectives for carry-over reservoir storage for drought water delivery protection.

Preliminary Determination of Delivery Reductions (Rationing). At such time that water supply is forecast to be less than that necessary to achieve full deliveries and reservoir carry-over storage goals, an initial determination of required delivery reduction or rationing is identified. Prior experience leads San Francisco to approach required customer water delivery shortages within a context of three stages of response: the first stage of response is associated with voluntary actions by customers and the second and third stages of response are associated with rationing programs enforced by San Francisco.

First Stage Program. San Francisco currently enforces numerous water use prohibitions and restrictions, and continues to use public information venues for the discouragement of wasteful uses of water. San Francisco also has numerous long-term water conservation programs which are providing reductions in water use but which are not at ultimate saturation at this time.

The first stage of the plan will rely on a voluntary public response to a declared water shortage. The objective of this first stage of program is to achieve a system-wide 5 to 10 percent reduction in water use.

Through an increase in public information dissemination, retail water customers will be alerted to the current status of water supply conditions and reminded of water use prohibitions and restrictions and currently available incentives and programs that will lead to reductions in water use. Public information will also target discretionary uses of water.

As a program to achieve near-immediate reductions in retail customer water use (and likely permanent in nature), San Francisco will also consider providing incentives that will accelerate on-going long-term conservation programs. Programs that may be targeted for acceleration include:

- *Toilet Rebate Program*
- *Water Audits and Water System Improvements*
- *Leak Repairs*

The water use reduction goal of this first stage program would also be coordinated with voluntary actions and programs by San Francisco's wholesale water customers to reduce their water demands on San Francisco by 5 to 10 percent. The reduction of water demands to San Francisco from these customers may be achieved through their increased utilization of alternative water supplies.

Second Stage Program. The second stage of response will include a mandatory water delivery rationing program.

The program will entail the enumeration of additional water use prohibitions and restrictions with disincentive consequences resulting from retail water customer non-compliance. The specific prohibitions and restrictions that will be enforced will be determined at the time that the need for the second stage program occurs. However, the water use prohibitions and restrictions associated with San Francisco's historical 25 percent system-wide water use reduction program (previously described in this section) serve as a menu for potential actions to be adopted in time of need.

The second element of the second stage program will be a specific goal for water use reduction by individual retail and wholesale water customers. Water use, by account or entity, will be targeted for reduction through application of formulas which consider historical use and indoor and outdoor water consumption. Compliance to water delivery allocations will be addressed through the assessment of excess use charges to those customers which exceed their allocations.

As an incentive to water use reduction by San Francisco retail water customers, the acceleration of long-term water conservation programs may also be considered during the second stage program.

The specific level of water use reduction that will be targeted by the second stage program is dependent on several factors which include the current water supply condition and the characteristics of water demand after being affected by the first stage program.

Analysis of current water demand characteristics indicates that a permanent reduction (hardening) of water demand occurred as a result of conservation programs employed during the recent drought. While San Francisco's customers achieved almost a 30 percent reduction to pre-drought demands during one year of the recent drought, this level of accomplishment is not expected to be achievable subsequent to the drought on a sustained or short-term basis. It is estimated that implementation of programs similar in effect to those applied during the recent drought will achieve a 10 to 20 percent reduction in current water demands.

Third Stage Program. The third stage program will be implemented at such time that water supply conditions reach a hydrologic circumstance not previously experienced by San Francisco.

The third stage program will require additional retail water customer response to an increased number of enforced water use prohibitions and restrictions, and an increased level of rationing. The objective of the third stage program will be to achieve water use reductions in excess of 20 percent.

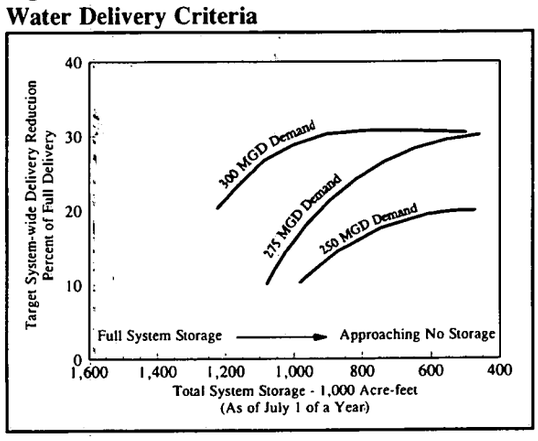
This report discusses various measures employed during the recent drought during an attempt to achieve a 45 percent reduction in retail water customer demands (as applied to the pre-drought demand). These measures included absolute limitations on water use based on residential customer classification and a proportion of historical use within the non-residential sectors. Although not anticipated to be required in the near-term, San Francisco would employ similar procedures to accommodate water shortages in excess of 20 percent.

Water Delivery Criteria. San Francisco has established criteria that relate water deliveries to water supply and its objectives to manage water deliveries during extended drought. These criteria provide guidance to San Francisco for the determination of the annual availability of water. The structure of the criteria was developed during the course of the recent drought, and incorporates procedures which were implemented during actual operations.

The water delivery criteria have been developed with the incorporation of a three-level staging of delivery reductions. Depending on the level of water demand that is occurring and the desired objective for maximum delivery reduction, one, two or all three of the stages are required.

Figure V-1 shows the relationship between San Francisco reservoir storage, water demands and the target for system-wide delivery reductions. As a drought progressively becomes more severe (as evidenced by declining reservoir storage), the level of required drought response (e.g., rationing) increases. These criteria assume that rationing in excess of 30 percent of full demands is not desired.

Figure V-1
Water Delivery Criteria



The water demands of San Francisco's retail and wholesale water customers are projected to increase from 248 mgd to 279 mgd during the period 1995 through year 2010. The water delivery criteria suggest that the first stage of drought response (first stage program) is required when San Francisco's total system storage approaches approximately 1,000,000 acre-feet. As a drought progresses into subsequent years, more intense levels of response (e.g., second and third stage programs) will be required to provide the targeted system-wide delivery reductions indicated by the criteria.

As illustrated in Figure V-1, the first stage of drought response will trigger at higher levels of system storage (i.e., earlier in a drought) and potentially at a higher level of delivery reduction as water demands increase in the future.

The above described water delivery criteria were developed through analysis of all historically experienced drought events and a consideration that a worse drought event may occur in the future. The criteria also assume the current operational requirements assigned to San Francisco facilities, and if these responsibilities change in the future the criteria may change.

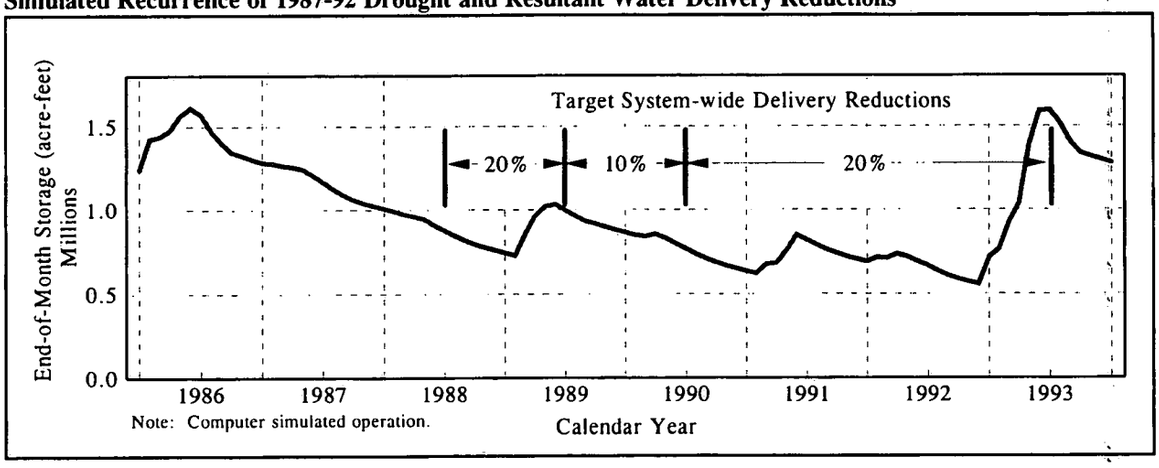
The criteria have been found to be viable through computer simulation of historical drought events and resultant San Francisco operations. Figure V-2 shows a hydrograph of computer-simulated San Francisco's total system storage and the periods of time when delivery reductions would be required during a recurrence of the recent 1987-92 drought. This illustration assumes a demand level of 275 mgd.

Implementation of Water Management Opportunities. In-lieu of requiring rationing by San Francisco customers, San Francisco will also consider the implementation of water purchases and exchanges for the purpose of offsetting the level of rationing.

Program Initiation Procedures. Prior to the initiation of any of the three stages of drought response programs, a draft plan will be prepared for the review by the San Francisco Public Utilities Commission. The draft plan will outline the water supply situation, proposed water use reduction objectives, alternatives to water use reductions, methods to calculate water use allocations and adjustments, compliance methodology and enforcement measures, and budget considerations.

The proposed plan for implementation, whether initial implementation, reduction or increasing the severity of the water shortage, will be advertised and presented for public hearing at a regularly scheduled Commission meeting for comment and examination in accordance with the requirements of California Water Code Section 6066 of the Government Code.

Figure V-2
Simulated Recurrence of 1987-92 Drought and Resultant Water Delivery Reductions



Note: Computer simulated operation.

EMERGENCY WATER SHORTAGE RESPONSE

San Francisco was hit by the Loma Preieta Earthquake in 1989. The Water Department worked with the Mayor's Office of Emergency Response to reconnect service to those who were impacted by the earthquake. Most of the homes that lost water service were reconnected back to the water system's lines within 72 hours.

Using this experience, the Water Department created an *Emergency Response Plan* in 1992. The plan is currently being updated. As a guiding principle, the first priority of the Water Department will be to maintain and reconnect water service throughout the city in order to maintain water for firefighting and sanitary needs.

San Francisco has planned for a water shortage emergency response and is continually looking at ways to further meet any challenges to the system due to natural disaster or emergency.

SLN

SFPUC
WATER
WASTEWATER
POWER

SAN FRANCISCO PUBLIC UTILITIES COMMISSION

1155 Market St., 11th Floor, San Francisco, CA 94103 • Tel. (415) 554-3155 • Fax (415) 554-3161 • TTY (415) 554.3488

S002636 et al

GAVIN NEWSOM
MAYOR

ANN MOLLER CAEN
PRESIDENT

E. DENNIS NORMANDY
VICE PRESIDENT

RICHARD SKLAR
DAVID HOCHSCHILD
F.X. CROWLEY

ED HARRINGTON
GENERAL MANAGER

July 14, 2008

Ms. Vicky Whitney, Deputy Director
State Water Resources Control Board
Division of Water Rights
P.O. Box 2000
Sacramento, CA 95812-2000

SUBJECT: 2008 and 2005 SSWDUs 2635, 2636, 2637, 2638; Change of Name/Address

Dear Ms. Whitney:

Enclosed are Supplemental Statements of Water Diversion and Use S002635, S002636, S002637, and S002638 for both 2005 and 2008 with Change of Name/address forms.

If you or your staff has any questions regarding this amended statement of diversion and use please contact me directly.

Sincerely,

Michael P.Carlin
Assistant General Manager, Water Enterprise

cc: E. Levin
D. Furman
File

STATE WATER RESOURCES
CONTROL BOARD
2008 JUL 28 PM 3:35
DIV OF WATER RIGHTS
SACRAMENTO

State of California, State Water Resources Control Board
Division of Water Rights
P.O. Box 2000, Sacramento, CA 95812-2000
Info: (916) 341-5300, FAX: (916) 341-5400 Web: http://waterrights.ca.gov

S002636%S%2004

2002, 2003, 2004

SUPPLEMENTAL STATEMENT OF WATER DIVERSION AND USE

If the information below is inaccurate, please line it out in red and provide current information.
Notify this office if ownership or address changes occur during the coming year.

Please Complete and Return This Form by JULY 1, 2005.

***If the mail recipient's name, address or phone No. is wrong or missing, please correct.**

Owner of Record: CITY & COUNTY OF SAN FRANCISCO;

PRIMARY CONTACT OR AGENT FOR MAIL & REPORTING:
CITY & COUNTY OF SAN FRANCISCO
C/O HETCH HETCHY WATER & POWER
1155 MARKET ST
SAN FRANCISCO, CA 94103

STATEMENT NO.: S002636
CONTACT PHONE NO.: (415)554-0725

STATE WATER RESOURCES CONTROL BOARD
2008 JUL 28 PM 3:35
DIV OF WATER RIGHTS SACRAMENTO

Source Name: ELEANORE CREEK
Tributary To: CHERRY CREEK
County: Tuolumne
Diversion Within: ~~1/4 of~~ NW1/4 Section 03, T01N, R19E, ~~MB&M~~ MDB&M

Year of First Use: 1918
Parcel Number:

A. **Water is Used Under:** Riparian claim _____ Pre-1914 right x Other (explain): _____

B. **Year of First Use:** (Please provide if missing above) _____

C. **Amount of Use:** Enter the amount (or the approximate amount) of water used each month, using the table below.

Amounts below are in: Gallons _____ Million Gallons (MG) _____ Acre-feet (AF) _____ Other _____

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total Annual
2002													
2003				See Attached Table									
2004													

D. **Purpose of Use** – Specify number of acres irrigated, stock watered, persons served, etc.

Irrigation _____ acres; Stockwatering _____; Domestic _____;

Other (specify) Power Generation and Municipal & Industrial uses

E. **Changes in Method of Diversion** – Describe any changes in your project since your previous statement was filed. (New pump, enlarged diversion dam, location of diversion, etc.)
None

F. Please answer only those questions below which are applicable to your project.

1. Conservation of water
   a. Are you now employing water conservation efforts? YES x NO
   Describe any water conservation efforts you have initiated: See Urban Water Management Plan

   b. If you are claiming credit for water conservation under section 1011 of the Water Code for your claimed pre-1914 appropriative right, please show the amount of water conserved:

   Reduction in Diversions:

   Year ____ _____ (AF/MG) Year ____ _____ (AF/MG) Year ____ _____ (AF/MG)

   Reduction in consumptive use:

   Year ____ _____ (AF/MG) Year ____ _____ (AF/MG) Year ____ _____ (AF/MG)

   I have data to support the above surface water use reductions due to conservation efforts. YES _____ NO _____

Storm Water
JUL 2008
Division of Water Quality

2. Water quality and wastewater reclamation See Urban Water Management Plan

a. Are you now or have you been using reclaimed water from a wastewater treatment facility, desalination facility or water polluted by waste to a degree which unreasonably affects such water for other beneficial uses? YES X NO ____.

b. If you are claiming credit due to the substitution of reclaimed water, desalinated water or polluted water in lieu of a claimed pre-1914 appropriative right under section 1010 of the Water Code, please show amounts of reduced diversions and amounts of substitute water supply used:

Amount of reduced diversion:
Year ____ _____ (AF/MG) Year ____ _____ (AF/MG) Year ____ _____ (AF/MG)

State the type of substitute water supply: _____

Amount of substitute water supply used:
Year ____ _____ (AF/MG) Year ____ _____ (AF/MG) Year ____ _____ (AF/MG)

I have data to support the above surface water use reductions due to the use of a substitute water supply. YES ____ NO ____.

3. Conjunctive use of surface water and groundwater See Urban Water Management Plan

a. Are you now using groundwater in lieu of surface water? YES X NO ____.

b. If you are claiming credit due to the substitution of groundwater for a claimed pre-1914 appropriative right under section 1011.5 of the Water Code, please show the amounts of groundwater used:

Year ____ _____ (AF/MG) Year ____ _____ (AF/MG) Year ____ _____ (AF/MG)

I have data to support the above surface water use reductions due to the use of groundwater. YES ____ NO ____.

I understand that it may be necessary to document the water savings claimed in "F" above if credit under Water Code sections 1010 and 1011 is sought in the future.

I declare that the information in this report is true to the best of my knowledge and belief.

DATE: 21 July, 2008 at San Francisco, California

SIGNATURE: _____

PRINTED NAME: Michael (first name) P. (middle initial) Carlin (last name)

COMPANY NAME: City and County of San Francisco, Public Utilities Commission

If there is insufficient space for your answers, please use the space provided below.

ITEM	CONTINUATION

GENERAL INFORMATION PERTAINING TO WATER RIGHTS IN CALIFORNIA

There are two principal types of surface water rights in California. They are riparian and appropriative rights.

A riparian right enables an owner of land bordering a natural lake or stream to take and use water on his riparian land. Riparian land must be in the same watershed as the water source and must never have been severed from the sources of supply by an intervening parcel without reservation of the riparian right to the severed parcel. Generally, a riparian water user must share the water supply with other riparian users. Riparian rights may be used to divert the natural flow of a stream but may not be used to store water for later use or to divert water which originates in a different watershed, water previously stored by others, return flows from use of groundwater, or other "foreign" water to the natural stream system.

An appropriative right is required for use of water on non-riparian land and for storage of water. Generally, appropriative rights may be exercised only when there is a surplus not needed by riparian water users. Since 1914, new appropriators have been required to obtain a permit and license from the State. Appropriative rights can be granted to waters "foreign" to the natural stream system.

Statements of Water Diversion and Use must be filed by riparian and pre-1914 appropriative water users as set forth in Water Code section 5100 with specific exceptions. The filing of a statement (1) provides a record of water use, (2) enables the State to notify such users if someone proposes a new appropriation upstream from their diversions, and (3) assists the State to determine if additional water is available for future appropriators.

The above discussion is provided for general information. For more specific information concerning water rights, please contact an attorney or write to this office. We have several pamphlets available. They include: (1) Statements of Water Diversion and Use, (2) Information Pertaining to Water Rights in California, and (3) Appropriation of Water in California.

CITY AND COUNTY OF SAN FRANCISCO - QUANTITY OF WATER USED

HOLM POWERHOUSE FLOW IN ACRE-FEET

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
2002	40,165	17,250	55,077	45,229	51,862	36,188	15,404	17,550	12,472	13,317	23,808	26,160	354,482
2003	42,436	33,562	28,385	33,501	53,098	45,836	16,618	14,364	18,946	10,675	12,920	17,744	328,086
2004	28,889	29,046	51,564	49,442	43,968	34,580	11,020	3,517	56	0	21,921	27,763	301,765

KIRKWOOD POWERHOUSE FLOW IN ACRE-FEET

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
2002	64,725	39,527	40,383	54,694	68,329	71,266	30,224	28,616	27,677	22,243	15,199	17,956	480,839
2003	23,026	18,912	27,174	61,135	81,174	78,883	34,610	28,748	27,691	24,631	19,799	236	426,018
2004	21,441	37,686	71,151	69,903	62,723	68,481	32,342	31,555	30,226	32,662	20,684	18,089	496,945

MOCCASIN POWERHOUSE FLOW in ACRE-FEET

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
2002	33,870	34,588	39,175	36,547	40,329	37,556	30,503	29,580	28,401	22,002	15,660	17,196	365,408
2003	23,979	18,869	28,108	36,555	39,100	38,305	33,736	29,340	29,165	23,224	12,553	0	312,934
2004	7,190	23,349	26,649	26,720	26,364	36,928	30,010	30,158	28,701	31,006	19,748	17,046	303,868

SAN JOAQUIN PIPELINE (DIVERSION TO SAN FRANCISCO) IN ACRE-FEET

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
2002	10,256	9,420	17,610	22,236	26,335	26,659	27,515	27,460	26,496	20,040	13,414	15,122	242,563
2003	15,144	13,696	19,623	20,302	22,430	26,077	27,612	27,495	26,499	24,589	10,675	0	234,141
2004	7,755	21,055	18,142	22,289	27,691	26,779	27,722	27,633	26,680	27,575	15,873	14,557	263,752

State of California, State Water Resources Control Board
Division of Water Rights, P.O. B~ 2000, Sacramento, CA 95812-2000
Info: (916) 341-5300, FAX: (916) 3 0, Web: http://www.waterrights.ca.gov

S002636S2001

1999, 2000, 2001

SUPPLEMENTAL STATEMENT OF WATER DIVERSION AND USE

If the information below is inaccurate, please line it out in red and provide current information.
Notify this office if ownership or address changes occur during the coming year.

2004 OCT 13 AM 11:06
DIV. OF WATER RIGHTS SACRAMENTO
STATE WATER RESOURCES CONTROL BOARD

Please Complete and Return This Form by July 1, 2002.
***If the mail recipient's name, address or phone No. is wrong or missing, please correct.**

Owner of Record: CITY & COUNTY OF SAN FRANCISCO

PRIMARY CONTACT OR AGENT FOR MAIL & REPORTING:
CITY & COUNTY OF SAN FRANCISCO
1155 MARKET ST
SAN FRANCISCO, CA 94103

STATEMENT NO.: S002636
CONTACT PHONE NO.: (415)554-0725

FOR ONLINE REPORTING AT
www.waterrights.ca.gov

USER NAME: S002636
PASSWORD: C21182

Source Name: ELEANORE CREEK
Tributary To: CHERRY CREEK
County: Tuolumne
Diversion Within: NW1/4 ~~[illegible]~~ Section 03, T01N, R19E, MB&M
Year of First Use: 1918
Parcel Number:

A. Water is used under: Riparian claim _____ Pre 1914 right X Other (explain): _____

B. Year of first use (Please provide if missing above) _____

C. Amount of Use – Enter the amount (or the approximate amount) of water used each month.

Amounts below are: Gallons _____ Acre-feet _____ Other _____

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total Annual
1999													
2000						SEE ATTACHED TABLE							
2001													

D. Purpose of Use - Specify number of acres irrigated, stock watered, persons served, etc.

Irrigation _____ acres; Stockwatering _____; Domestic _____;

Other (specify) Municipal, Industrial & Power

E. Changes in Method of Diversion – Describe any changes in your project since your previous statement was filed. (New pump, enlarged diversion dam, location of diversion, etc.)
NONE

F. Please answer only those questions below which are applicable to your project.

1. Conservation of water
   a. Are you now employing water conservation efforts? YES ___ NO ___
   Describe any water conservation efforts you have initiated: See attached Urban Water Management Plan

   b. If credit toward beneficial use of water under claimed pre 1914 appropriative water right for water not used due to a conservation effort is claimed under section 1011 of the Water Code, please show the amounts of water conserved:

   Reductions in Diversions:

   yr____ _____ (af/mg) yr____ _____ (af/mg) yr____ _____ (af/mg)

   Reductions in consumptive use:

   yr____ _____ (af/mg) yr____ _____ (af/mg) yr____ _____ (af/mg)

   I have data to support the above surface water use reductions due to conservation efforts. YES ___ NO ___

5-11-05 PLM

ST-SUPPL (6-03)

6-7-05 PLM
WRMS

2. Water quality and wastewater reclamation See attached Urban Water Management Plan

   a. Are you now or have you been using reclaimed water from a wastewater treatment facility, desalination facility or water polluted by waste to a degree which unreasonably affects such water for other beneficial uses? YES _____ NO _____.

   b. If credit toward use under a claimed pre 1914 appropriative water right through substitution of reclaimed water, desalinated water or polluted water in lieu of appropriated water is claimed under section 1010 of the Water Code, please show amounts of reduced diversions and amounts of reclaimed water used:

   yr_____ _____ (af/mg) yr_____ _____ (af/mg) yr_____ _____ (af/mg)
   I have data to support the above surface water use reductions due to wastewater reclamation. YES ___ NO ___

3. Conjunctive use of surface water and groundwater See attached Urban Water Management Plan

   a. Are you now using groundwater in lieu of surface water? YES _____ NO _____.

   b. If credit toward use under a claimed pre 1914 appropriative right through substitution of groundwater in lieu of appropriated water is claimed under section 1011.5 of the Water Code, please show the amounts of groundwater used:

   yr_____ _____ (af/mg) yr_____ _____ (af/mg) yr_____ _____ (af/mg)
   I have data to support the above surface water use reductions due to conjunctive use efforts. YES ___ NO ___

I understand that it may be necessary to document the water savings claimed in "F." above if credit under Water Code sections 1010 and 1011 is sought in the future.

I declare that the information in this report is true to the best of my knowledge and belief.

DATE: September 22, 2004 at San Francisco, California

SIGNATURE: Michael P. Carlin

PRINTED NAME: Michael (first name) P. (middle init.) Carlin (last name)

COMPANY NAME: City and County of San Francisco, Public Utilites Commission

If there is insufficient space for your answers, please use the space provided below.

ITEM	CONTINUATION

GENERAL INFORMATION PERTAINING TO WATER RIGHTS IN CALIFORNIA

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An appropriative right is required for use of water on nonriparian land and for storage of water. Generally, appropriative rights may be exercised only when there is a surplus not needed by riparian water users. Since 1914, new appropriators have been required to obtain a permit and license from the State. Appropriate rights can be granted to waters "foreign" to the natural stream system.

Statements of Water Diversion and Use must be filed by riparian and pre 1914 appropriative water users as set forth in Water Code section 5100 with specific exceptions. The filing of a statement (1) provides a record of water use, (2) enables the State to notify such users if someone proposes a new appropriation upstream from their diversions, and (3) assists the State to determine if additional water is available for future appropriators.

The above discussion is provided for general information. For more specific information concerning water rights, please contact an attorney or write to this office. We have several pamphlets available. They include: (1) Statements of Water Diversion and Use, (2) Information Pertaining to Water Rights in California, and (3) Appropriation of Water in California.

"The energy challenge facing California is real. Every California needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at http://www.swrcb.ca.gov"

SSWDU

CITY AND COUNTY OF SAN FRANCISCO

HOLM POWERHOUSE FLOW IN ACRE-FEET

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1999	17,968	48,371	59,292	58,372	60,040	58,493	24,409	20,916	12,333	13,868	2,344	1,273	377,679
2000	5,794	39,741	60,722	55,585	60,932	58,026	56,700	49,698	49,093	25,817	0	4,612	466,719
2001	12,032	25,248	18,926	11,064	16,007	3,709	13,878	18,676	11,635	2,521	3,187	46,742	183,626

KIRKWOOD POWERHOUSE FLOW IN ACRE-FEET

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1999	26,231	61,966	81,535	74,761	81,650	82,772	51,586	24,175	26,003	23,032	15,832	19,809	569,351
2000	24,056	32,660	78,591	75,187	83,583	82,858	33,882	26,761	23,752	24,010	24,468	20,099	529,906
2001	17,012	32,507	38,400	54,690	79,799	35,143	29,871	28,877	28,040	27,729	24,740	30,756	427,565

MOUNTAIN TUNNEL - MOCCASIN POWERHOUSE FLOW IN ACRE-FEET

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1999	25,341	33,540	37,860	36,268	38,323	37,537	32,043	25,271	26,325	23,661	16,298	20,190	352,657
2000	24,379	28,707	39,084	37,676	39,961	39,479	28,566	26,909	24,438	24,702	25,071	20,700	359,672
2001	16,322	32,947	38,182	37,299	38,993	33,096	29,191	29,619	28,679	28,451	25,404	25,914	364,098

SAN JOAQUIN PIPELINE FLOW (DIVERSION TO SAN FRANCISCO) IN ACRE-FEET

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1999	15,197	12,129	10,798	18,619	21,525	20,694	21,390	23,264	24,008	21,316	14,503	18,726	222,169
2000	21,822	14,525	8,801	13,480	22,853	22,151	22,788	22,671	21,798	22,443	21,269	15,150	229,851
2001	8,588	14,013	21,505	20,600	23,004	26,975	27,868	27,810	26,783	25,765	23,359	12,508	258,778

LOWER CHERRY AQUEDUCT FLOW IN ACRE-FEET

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1999	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	7	0	0	7
2001	0	0	0	0	0	0	0	0	0	0	0	0	0

The 7 acre-feet was a rough estimate for Oct 2000 Diversion. The water was used for maintence purpose.

STATE WATER RESOURCES CONTROL BOARD
DIVISION OF WATER RIGHTS
P. O. BOX 2000, SACRAMENTO, CA 95812-2000
(916) 657-2170

SUPPLEMENTAL STATEMENT OF WATER DIVERSION AND USE

If the information below is inaccurate, please line it out in red and provide current information
Notify this office if ownership or address changes occur during the coming year.

PLEASE COMPLETE AND RETURN THIS FORM BY JULY 1, 1999

OWNER OF RECORD: CITY AND COUNTY OF SAN FRANCISCO

c/o HETCH HETCHY WATER AND POWER
1155 MARKET STREET
SAN FRANCISCO, CA 94103

STATEMENT NO: S002636

99 JUL 21 PM 2:04
DIV. OF WATER RIGHTS
SACRAMENTO
STATE WATER RESOURCES CONTROL BOARD

SOURCE: ELEANOR CREEK
TRIBUTARY TO: CHERRY CREEK
COUNTY: TUOLUMNE
DIVERSION
WITHIN: NW1/4 OF SE1/4 SECTION 3, T1N, R19E, MDB&M

TELEPHONE NUMBER: (415) 554-0725
YEAR OF FIRST USE: 1960
PARCEL NO: N/A

A. Water is used under: Riparian claim _____ Pre 1914 right X Other (explain) _____

B. Year of first use (Please provide if missing above) _____

C. Amount of Use - Enter the amount of water used each month. If monthly and annual use are not known, check the months in which water was used.

Amounts below are: Gallons _____ Acre-feet X Other _____

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total Annual
1996	S	E	E										
1997	A	T	T	A	C	H	E	D					
1998													

D. Purpose of Use - Specify number of acres irrigated, stock watered, persons served, etc.

Irrigation _____ acres; Stockwatering _____ ; Domestic _____ ;

Other (specify) Municipal, Industrial and Power

E. Changes in Method of Diversion - Describe any changes in your project since your previous statement was filed. (New pump, enlarged diversion dam, location of diversion, etc.)

F. Please answer only those questions below which are applicable to your project.

1. Conservation of water
   a. Describe any water conservation efforts you may have started: See attached Urban Water Management Plan
   b. _____
   c. If credit toward beneficial use of water under claimed pre 1914 appropriative water right for water not used due to a conservation effort is claimed under section 1011 of the Water Code, please show the amounts of water conserved:

   19____ _____ (af/mg) 19____ _____ (af/mg) 19____ _____ (af/mg)

2. Water quality and wastewater reclamation

   a. Are you now or have you been using reclaimed water from a wastewater treatment facility, desalination facility or water polluted by waste to a degree which unreasonably affects such water for other beneficial uses? YES See attached UWMP NO _____

MAR - 2000

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STATE WATER RESOURCES CONTROL BOAR
DIVISION OF WATER RIGHTS
P.O. BOX 2000. SACRAMENTO. CA 95812-2000
(916) 657-2170

b. If credit toward use under a claimed pre 1914 appropriative water right through substitution of reclaimed water, desalinated water or polluted water in lieu of appropriated water is claimed under section 1010 of the Water Code, please show amounts of reduced diversion and amounts of reclaimed water used:

19____ _____ (af/mg) 19____ _____ (af/mg) 19____ _____ (af/mg)

3. Conjunctive use of surface water and groundwater

a. Are you now using groundwater in lieu of surface water? YES ____ N ____

b. If credit toward use under a claimed pre-1914 appropriative right through substitution of groundwater in lieu of appropriated water is claimed under section 1011.5 of the Water Code, please show the amounts of groundwater used:

19____ _____ (af/mg) 19____ _____ (af/mg) 19____ _____ (af/mg)

I declare that the information in this report is true to the best of my knowledge and belief.

DATE: July 1, 19 99 at SAN FRANCISCO, California

SIGNATURE: Michael P. Carlin

PRINTED NAME: MICHAEL (first name) P. (middle init.) CARLIN (last name)

COMPANY NAME: CITY AND COUNTY OF SAN FRANCISCO PUBLIC UTILITIES COMMISSION

If there is insufficient space for your answers. please use the space provided below

ITE CONTINUATION

GENERAL INFORMATION PERTAINING TO WATER RIGHTS IN CALIFORNIA

There are two principal types of surface water rights in California. They are riparian and appropriative rights.

A riparian right enables an owner of land bordering a natural lake or stream to take and use water on his riparian land. Riparian land must be in the same watershed as the water source and must never have been severed from the sources of supply by an intervening parcel without reservation of the riparian right to the severed parcel. Generally, a riparian water user must share the water supply with other riparian users. Riparian rights may be used to divert the natural flow of a stream but may not be used to store water for later use or divert water which originates in a different watershed, or return flows from use of groundwater.

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Statements of Water Diversion and Use must be filed by riparian and per 1914 appropriative water users. The filing of a statement (1) provides arecord of water use, (2) enables the State to notify such users if someone proposes a new appropriation upstream from their diversions, and (3) assists the State to determine if additional water is available for future appropriators.

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SUP-STATE (12-98)

STATE WATER RESOURCES CONTROL BOARD
DIVISION OF WATER RIGHTS
P. O. BOX 2000, SACRAMENTO, CA 95812-2000
(916) 657-2170

SUPPLEMENTAL STATEMENT OF WATER DIVERSION AND USE

If the information below is inaccurate. please line it out in red and provide current information
Notify this office if ownership or address changes occur during the coming year.

PLEASE COMPLETE AND RETURN THIS FORM BY JULY 1, 1999

OWNER OF RECORD: CITY AND COUNTY OF SAN FRANCISCO

c/o HETCH HETCHY WATER AND POWER
1155 MARKET STREET
SAN FRANCISCO, CA 94103

STATEMENT NO: S002636

99 JUL 21 PM 2:04
DIV. OF WATER RIGHTS
SACRAMENTO
STATE WATER RESOURCES CONTROL BOARD

SOURCE: ELEANOR CREEK
TRIBUTARY TO: CHERRY CREEK
COUNTY: TUOLUMNE
DIVERSION
WITHIN: NW1/4 OF SE1/4 SECTION 3, T1N, R19E, MDB&M

TELEPHONE NUMBER: (415) 554-0725
YEAR OF FIRST USE: 1960
PARCEL NO: N/A

A. Water is used under: Riparian claim _____ Pre 1914 right x Other (explain) _____

B. Year of first use (Please provide if missing above) _____

C. Amount of Use - Enter the amount of water used each month. If monthly and annual use are not known, check the months in which water was used.

Amounts below are: Gallons _____ Acre-feet x Other _____

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total Annual
1996	S	E	E										
1997	A	T	T	A	C	H	E	D					
1998													

D. Purpose of Use - Specify number of acres irrigated, stock watered, persons served, etc.

Irrigation _____ acres; Stockwatering _____ ; Domestic _____ ;

Other (specify) Municipal, Industrial and Power

E. Changes in Method of Diversion - Describe any changes in your project since your previous statement was filed. (New pump, enlarged diversion dam, location of diversion, etc.)

_____

F. Please answer only those questions below which are applicable to your project.

1. Conservation of water
   a. Describe any water conservation efforts you may have started: See attached Urban Water Management Plan
   b. _____
   c. If credit toward beneficial use of water under claimed pre 1914 appropriative water right for water not used due to a conservation effort is claimed under section 1011 of the Water Code, please show the amounts of water conserved:

   19____ _____ (af/mg) 19____ _____ (af/mg) 19____ _____ (af/mg)

2. Water quality and wastewater reclamation

   a. Are you now or have you been using reclaimed water from a wastewater treatment facility, desalination facility or water polluted by wastes to a degree which unreasonably affects such water for other beneficial uses? YES See attached UWMP NO

SUP-STATE (12-98)

MAR - 9 2000

b. If credit toward use under a claimed pre 1914 appropriative water right through substitution of reclaimed water, desalinated water or polluted water in lieu of appropriated water is claimed under section 1010 of the Water Code, please show amounts of reduced diversion and amounts of reclaimed water used:

19____ _____ (af/mg) 19____ _____ (af/mg) 19____ _____ (af/mg)

3. Conjunctive use of surface water and groundwater

a. Are you now using groundwater in lieu of surface water? YES ____ N ____

b. If credit toward use under a claimed pre-1914 appropriative right through substitution of groundwater in lieu of appropriated water is claimed under section 1011.5 of the Water Code, please show the amounts of groundwater used:

19____ _____ (af/mg) 19____ _____ (af/mg) 19____ _____ (af/mg)

I declare that the information in this report is true to the best of my knowledge and belief.

DATE: July 1, 19 99 at SAN FRANCISCO, California

SIGNATURE: Michael P. Carlin

PRINTED NAME: MICHAEL (first name) P. (middle init.) CARLIN (last name)

COMPANY NAME: CITY AND COUNTY OF SAN FRANCISCO PUBLIC UTILITIES COMMISSION

If there is insufficient space for your answers. please use the space provided below

ITE CONTINUATION

GENERAL INFORMATION PERTAINING TO WATER RIGHTS IN CALIFORNIA

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SUP-STATE (12-98)

STATE WATER RESOURCES CONTROL BOARD
DIVISION OF WATER RIGHTS
P. O. BOX 2000, SACRAMENTO, CA 95812-2000
(916) 657-2170

SUPPLEMENTAL STATEMENT OF WATER DIVERSION AND USE

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Notify this office if ownership or address changes occur during the coming year.

PLEASE COMPLETE AND RETURN THIS FORM BY JULY 1, 1999

OWNER OF RECORD: CITY AND COUNTY OF SAN FRANCISCO

c/o HETCH HETCHY WATER AND POWER
1155 MARKET STREET
SAN FRANCISCO, CA 94103

STATEMENT NO: S002636

99 JUL 21 PM 2:04
DIV. OF WATER RIGHTS
SACRAMENTO
STATE WATER RESOURCES CONTROL BOARD

SOURCE: ELEANOR CREEK
TRIBUTARY TO: CHERRY CREEK
COUNTY: TUOLUMNE
DIVERSION
WITHIN: NW1/4 OF SE1/4 SECTION 3, T1N, R19E, MDB&M

TELEPHONE NUMBER: (415) 554-0725
YEAR OF FIRST USE: 1960
PARCEL NO: N/A

A. Water is used under: Riparian claim _____ Pre 1914 right X Other (explain) _____

B. Year of first use (Please provide if missing above) _____

C. Amount of Use - Enter the amount of water used each month. If monthly and annual use are not known, check the months in which water was used.

Amounts below are: Gallons _____ Acre-feet X Other _____

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total Annual
1996	S	E	E										
1997	A	T	T	A	C	H	E	D					
1998													

D. Purpose of Use - Specify number of acres irrigated, stock watered, persons served, etc.

Irrigation _____ acres; Stockwatering _____ ; Domestic _____ ;

Other (specify) Municipal, Industrial and Power

E. Changes in Method of Diversion - Describe any changes in your project since your previous statement was filed. (New pump, enlarged diversion dam, location of diversion, etc.)

F. Please answer only those questions below which are applicable to your project.

1. Conservation of water
   a. Describe any water conservation efforts you may have started: See attached Urban Water Management Plan
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   19____ _____ (af/mg) 19____ _____ (af/mg) 19____ _____ (af/mg)

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   a. Are you now or have you been using reclaimed water from a wastewater treatment facility, desalination facility or water polluted by waste to a degree which unreasonably affects such water for other beneficial uses? YES See attached UWMP NO ____

SUP-STATE (12-98)

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STATE WATER RESOURCES CONTROL BOAR
DIVISION OF WATER RIGHTS
P.O. BOX 2000. SACRAMENTO. CA 95812-2000
(916) 657-2170

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a. Are you now using groundwater in lieu of surface water? YES ____ N ____

b. If credit toward use under a claimed pre-1914 appropriative right through substitution of groundwater in lieu of appropriated water is claimed under section 1011.5 of the Water Code, please show the amounts of groundwater used:

19____ _____ (af/mg) 19____ _____ (af/mg) 19____ _____ (af/mg)

I declare that the information in this report is true to the best of my knowledge and belief.

DATE: July 1, 19 99 at SAN FRANCISCO, California

SIGNATURE: Michael P. Carlin

PRINTED NAME: MICHAEL (first name) P. (middle init.) CARLIN (last name)

COMPANY NAME: CITY AND COUNTY OF SAN FRANCISCO PUBLIC UTILITIES COMMISSION

If there is insufficient space for your answers. please use the space provided below

ITE CONTINUATION

GENERAL INFORMATION PERTAINING TO WATER RIGHTS IN CALIFORNIA

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SUP-STATE (12-98)

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD
Division of Water Rights

P.O. BOX 2000 SACRAMENTO, CA 95812-2000
901 P ST. SACRAMENTO, CA 95814
(916) 322-4503

(916) 324-5676

STATE WATER RESOURCES CONTROL BOARD
1991 JUN 14 PM 3:17
DIV. OF WATER RIGHTS SACRAMENTO

SUPPLEMENTAL STATEMENT OF WATER DIVERSION AND USE

STATEMENT NO: 002636
As Amended

DIVERTER OF RECORD:

HETCH HETCHY WATER & POWER
1155 MARKET STREET
SAN FRANCISCO, CA 94103

TELEPHONE NUMBER:
(415) 550-6500

IF NAME/ADDRESS/PHONE NO. IS WRONG OR MISSING, PLEASE CORRECT.

SOURCE: ~~LAKE ELEAN~~ Eleanor Creek

TRIBUTARY TO: CHERRY CREEK

COUNTY: TUOLUMNE

DIVERSION WITHIN:
a) NW¼ Section 3, T1N, R19E, MDB&M (Lake Eleanor Reservoir)
b) NW¼ Section 31, T1N, R19E, MDB&M (Lower Cherry Diversion Dam)
~~174 OF N 1/4 SECTION 05, T01N, R19E, MDB&M.~~

INSTRUCTIONS: Please complete Items A. B and C. Item D should be completed if you replaced all or part of your regular water supply with reclaimed or polluted water. RETURN THIS FORM BY JULY 1, 1991. (Additional information on reverse side of this form.)

A. Amount of Use - Fill in the amount of water used each month. If monthly and annual use are not known, check the months in which water was used.

Amounts below are: ☐ Gallons ☐ Acre-feet ☐ _____ (other)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total Annual
1988													
1989		SEE ATTACHMENT											
1990													

B. Purpose of Use - Specify number of acres irrigated, stock watered, persons served, etc.

Irrigation _____

Stockwatering _____

Domestic _____

Other (specify) municipal, industrial and power

C. Changes in Method of Diversion - Describe any changes in your project since your previous statement was filed. (New pump, enlarged diversion dam, location of diversion, etc.)

None

D. If part of the water listed in Part A consists of reclaimed or polluted water, please indicate the annual amounts of reclaimed or polluted water in the space below.

I declare under penalty of perjury that the information in this report is true to the best of my knowledge and belief.

DATED: June 10, 19 91, at San Francisco, California

Signature: [signature]
Anson B. Moran, General Manager

WR 40-1 (2/90)

0771

1990

SUPPLEMENTAL STATEMENT OF WATER DIVERSION AND USE
ATTACHMENT FOR AMENDED STATEMENT 2636

Amended Statement of Water Diversion and Use is being filed with this supplemental statement. The attached table shows all diversions to San Francisco for Municipal and Industrial use and diversions through three powerhouses; however, use of water described in this statement is only through the Holm and Moccasin powerhouses. The diversion records are for the years 1981 through 1990.

S-2 636

STATE WATER RESOURCES CONTROL BOARD, DIVISION OF WATER RIGHTS
P.O. BOX 2000 SACRAMENTO, CA 95812-2000
(916) 657-2170

SUPPLEMENTAL STATEMENT OF WATER DIVERSION AND USE

STATE WATER RESOURCES CONTROL BOARD
96 JUN 26 PM 3:00
DIV OF WATER RIGHTS SACRAMENTO

If the information below is inaccurate, please line it out in red and provide current information.
Notify this office if ownership or address changes occur during the coming year.

PLEASE COMPLETE AND RETURN THIS FORM BY JULY 1, 1996.

OWNER OF RECORD: CITY & COUNTY OF SAN FRANCISCO

CITY & COUNTY OF SAN FRANCISCO
1155 MARKET ST
SAN FRANCISCO, CA 94103

STATEMENT NO: S002636

SOURCE: ELEANORE CREEK
TRIBUTARY TO: CHERRY CREEK
COUNTY: TUOLUMNE
DIVERSION
WITHIN: ¼ OF NW¼ SECTION 3, T1N, R19E, MB&M.

TELEPHONE NUMBER: (415) 554-0725
YEAR OF FIRST USE: 1918
PARCEL NO:

A. Water is used under: Riparian claim _____; Pre 1914 right __xx__; Other (explain) _____

B. Year of first use (Please provide if missing above) _____.

C. Amount of Use - Enter the amount of water used each month. If monthly and annual use are not known, check the months in which water was used.

Amounts below are: ❑ Gallons ☒ Acre-feet ❑ (other) _____

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT	OCT.	NOV.	DEC	TOTAL ANNUAL
1993													
1994				(See attached table)									
1995													

D. Purpose of Use - Specify number of acres irrigated, stock watered, persons served, etc.
Irrigation _____acres; Stockwatering _____; Domestic _____
Other (specify) Municipal, Industrial, & Power

E. Changes in Method of Diversion - Describe any changes in your project since your previous statement was filed. (New pump, enlarged diversion dam, location of diversion, etc.)
None

F. If part of the water listed in Part C consists of reclaimed or polluted water, please indicate the annual amounts of reclaimed or polluted water in the space below.

I declare under penalty of perjury that the information in this report is true to the best of my knowledge and belief.

DATED: June 14, 19 96 at San Francisco, California

SIGNATURE: L. T. Klein

PRINTED NAME: Lawrence (FIRST NAME) T. (M. NAME) Klein (LAST NAME)

COMPANY NAME: Hetch Hetchy Water & Power, City & County of San Francisco

See back of page for General Information. If there is insufficient space for your answers, please number them in the space provided on the back of this form.

WR40-1 (4/96)

ITEM CONTINUATION

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"Statements of Water Diversion and Use"
"Information Pertaining to Water Rights in California"
"Water Rights for Stockponds Constructed Prior to 1969"
"Appropriation of Water in California"

Holm Powerhouse Flow, AF

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1993	20,817	25,753	52,614	55,394	57,540	55,236	36,799	11,367	11,687	482	216	355	328,260
1994	2,261	8,118	57,463	47,720	60,823	21,814	18,474	19,622	4,352	7,991	36,702	53,048	338,388
1995	44,805	52,554	41,578	56,803	58,838	57,608	60,970	37,732	18,581	25,450	740	19,043	474,702

Kirkwood Powerhouse Flow, AF

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1993	47,839	49,113	57,648	62,031	75,132	75,132	71,913	35,520	22,693	24,125	18,815	11,135	551,096
1994	11,863	15,616	68,584	42,363	52,088	47,203	26,335	26,973	27,713	35,230	35,147	42,272	431,387
1995	62,846	66,837	70,215	69,154	71,841	72,175	64,465	66,395	26,473	22,780	15,790	18,962	627,933

Mountain Tunnel - Moccasin Powerhouse Flow, AF

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1993	41,076	37,158	40,651	39,507	42,577	41,403	42,442	27,245	23,304	25,074	19,148	11,810	391,395
1994	12,353	15,775	40,502	37,985	42,161	35,724	24,216	25,232	27,794	35,722	36,060	38,686	372,210
1995	39,901	33,814	38,580	37,946	38,537	37,244	41,088	41,199	27,138	23,564	16,606	20,910	396,527

San Joaquin Pipeline Flow(Diversion to San Francisco), AF

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1993	7,470	14,102	15,465	15,223	22,116	21,180	21,679	22,088	21,943	22,407	11,421	8,166	203,260
1994	8,186	13,380	21,788	21,820	20,571	21,737	22,383	23,744	26,388	22,971	14,664	14,797	232,429
1995	12,530	1,311	7,047	12,811	17,004	21,013	21,491	21,511	20,717	20,265	14,271	14,797	184,768

Lower Cherry Aqueduct Flow, AF

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1993	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0	0	0	0	0

STATE WATER RESOURCES
CONTROL BOARD
'96 JUN 26 PM 3:00
DIV. OF WATER RIGHTS
SACRAMENTO

S-2 636

*** PLEASE COMPLETE, SUBMIT THE ORIGINAL AND MAKE A COPY FOR YOUR RECORDS ***

12/18/95

MAR 17 1995

H.H.W.P.

STATE WATER RESOURCES CONTROL BOARD
DIVISION OF WATER RIGHTS

P.O. BOX 2000 SACRAMENTO, CA 95812-2000

SUPPLEMENTAL STATEMENT OF WATER DIVERSION AND USE

STATE WATER RESOURCES CONTROL BOARD
1995 JUN 28 PM 12: 28
DIV. OF WATER RIGHTS SACRAMENTO

STATEMENT NO: S002636
OWNER OF RECORD: ~~XXXX

***** PLEASE COMPLETE, SUBMIT THE ORIGINAL AND MAKE A COPY FOR YOUR RECORDS *****

E. Changes in Method of Diversion - Describe any changes in your project since your previous statement was filed. (New pump, enlarged diversion dam, location of diversion, etc.)

NONE

F. If part of the water listed in Part C consists of reclaimed or polluted water, please indicate the annual amounts of reclaimed or polluted water in the space below.

I declare under penalty of perjury that the information in this report is true to the best of my knowledge and belief.

DATED: 6/23/95, 19____, at San Francisco, California

SIGNATURE: L. T. Klein

PRINTED NAME: Lawrence (FIRST NAME) T (M. NAME) Klein (LAST NAME)

COMPANY NAME: Hetch Hetchy Water & Power

GENERAL INFORMATION PERTAINING TO WATER RIGHTS IN CALIFORNIA

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"Water Rights for Stockponds Constructed Prior to 1969"
"Appropriation of Water in California"

Date: 6/15/95 Time: 15:02:28

From: Michael Tsang To: Don Kienlen

Holm Powerhouse Flow, AF

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1991	8091	301	83	24202	51695	52524	29129	23365	10483	10177	8295	7129	225474
1992	9283	21469	27023	44166	38301	18970	13575	12776	10717	8932	10479	16435	232126
1993	20817	25753	52614	55394	57540	55236	36799	11367	11687	482	216	355	328260
1994	2261	8118	57463	47720	60823	21814	18474	19622	4352	7991	36702	53048	

Kirkwood Powerhouse Flow, AF

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1991	26432	8644	9308	16324	42389	40641	39086	37680	30518	31500	30290	31684	344496
1992	35869	19339	40443	38620	38293	28243	22645	24206	23626	25702	23371	38573	358930
1993	47839	49113	57648	62031	75132	75132	71913	35520	22693	24125	18815	11135	551096
1994	11863	15616	68584	42363	52088	47203	26335	26973	27713	35230	35147	42272	

Mountain Tunnel - Moccasin Powerhouse Flow, AF

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1991	25275	8918	9168	15822	40334	38692	37083	35577	28592	30750	29107	32069	331387
1992	34546	18934	38692	36962	36853	27540	22312	23109	22865	22635	22459	36732	343639
1993	41076	37158	40651	39507	42577	41403	42442	27245	23304	25074	19148	11810	391395
1994	12353	15775	40502	37985	42161	35724	24216	25232	27794	35722	36060	38686	

San Joaquin Pipeline Flow(Diversion to San Francisco), AF

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1991	13293	6466	6635	14120	12337	6496	19882	21074	17994	15047	14405	15096	162845
1992	15108	14212	15261	14678	20513	21025	16881	15039	14485	15078	10871	6924	180075
1993	7470	14102	15465	15223	22116	21180	21679	22088	21943	22407	11421	8166	203260
1994	8186	13380	21788	21820	20571	21737	22383	23744	26388	22971	14664	14797	

Lower Cherry Aqueduct Flow, AF

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1991	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0

STATE WATER RESOURCES CONTROL BOARD
DIVISION OF WATER RIGHTS
P.O. Box 2000
Sacramento, CA 95812-2000

STATEMENT OF WATER DIVERSION AND USE INFORMATION SHEET

STATEMENT NO. S002636

DIVERSION SITE:

OWNER'S NAME UNITED STATES
(FIRST) (MIDDLE) (LAST)

PARCEL NO. NONE

PLACE OF USE:

OWNER'S NAME SERVICE AREA OF THE CITY & COUNTY OF SAN FRANCISCO
(FIRST) (MIDDLE) (LAST)

1. **PARCEL NO.** _____
2. **PARCEL NO.** _____
3. **PARCEL NO.** _____

PERSON OR FIRM TO RECEIVE ALL CORRESPONDENCE AND SUPPLEMENTAL STATEMENTS:

OWNER/~~LESSEE/AGENT/OTHER~~ CITY & COUNTY OF SAN FRANCISCO

NAME c/o HETCH HETCHY WATER AND POWER
(FIRST) (MIDDLE) (LAST)

MAILING ADDRESS 1155 MARKET STREET
SAN FRANCISCO, CALIFORNIA 94103
(CITY) (STATE) (ZIP)

TELEPHONE NO. (415) 554 - 0725

OTHERS USING ABOVE DIVERSION LOCATION: NONE

1. **NAME** _____
(FIRST) (MIDDLE) (LAST)

MAILING ADDRESS _____
_____
(CITY) (STATE) (ZIP)

TELEPHONE NO. (_____) _____ - _____

2. **NAME** _____
(FIRST) (MIDDLE) (LAST)

MAILING ADDRESS _____
_____
(CITY) (STATE) (ZIP)

TELEPHONE NO. (_____) _____ - _____

☐ ADDITIONAL INFORMATION CONTINUED ON BACK OF PAGE OR ATTACHED

PLEASE USE THE OTHER SIDE TO PROVIDE THE ABOVE INFORMATION FOR ADDITIONAL OWNERS OR PLACES OF USE AND CHECK THE ADDITIONAL INFORMATION BOX.

(1/95)

S-2 636

STATE WATER RESOURCES CONTROL BOARD
DIVISION OF WATER RIGHTS

P.O. BOX 2000 SACRAMENTO, CA 95812-2000
(916) 657-1875

SUPPLEMENTAL STATEMENT OF WATER DIVERSION AND USE

DIVERTER OF RECORD:

STATEMENT NO: 002636
ID: 10014706

CITY & COUNTY OF SAN FRANCISCO
C/O HETCH HETCHY WATER & POWER
1155 MARKET ST
SAN FRANCISCO CA 94103

TELEPHONE NUMBER:
(415) ~~550-6500~~ 554-0725

IF NAME/ADDRESS/PHONE NO. IS WRONG OR MISSING, PLEASE CORRECT.

SOURCE: ~~XXXXXXXXXXXX~~ Eleanor Creek

TRIBUTARY TO: CHERRY CREEK

COUNTY: TUOLUMNE

YEAR OF FIRST USE: ~~XXXXX~~ 1918

DIVERSION WITHIN: 1/4 OF ~~NE1/4~~ NW 1/4 SECTION ~~05~~ 3, T01N, R19E, MDB&M.

COMPLETE AND RETURN THIS FORM BY JULY 1, 1994.

A. Water is used under: Riparian claim _____; Pre 1914 right x; Other (explain) _____

B. Year of first use (Please provide if missing above) _____.

C. Amount of Use - Enter the amount of water used each month. If monthly and annual use are not known, check the months in which water was used.

Amounts below are: ☐ Gallons ☒ Acre-feet ☐ (other) _____

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL ANNUAL
1991		SEE ENCLOSED TABLE											
1992													
1993													

D. Purpose of Use - Specify number of acres irrigated, stock watered, persons served, etc.
Irrigation _____ acres; Stockwatering _____; Domestic _____
Other (specify) municipal, industrial, and power.

E. Changes in Method of Diversion - Describe any changes in your project since your previous statement was filed. (New pump, enlarged diversion dam, location of diversion, etc.)

NONE

F. If part of the water listed in Part C consists of reclaimed or polluted water, please indicate the annual amounts of reclaimed or polluted water in the space below.

STATE WATER RESOURCES CONTROL BOARD
1994 JUL 27 PM 3:25
DIV. OF WATER RIGHTS
SACRAMENTO

I declare under penalty of perjury that the information in this report is true to the best of my knowledge and belief.

DATED: 7/14/94, 19 ____, at San Francisco, California

Signature: Lawrence T. Klein

WR 40-I (1/94)
FOR0127R2

1522 1993

GENERAL INFORMATION PERTAINING TO WATER RIGHTS IN CALIFORNIA

There are two principal types of surface water rights in California. They are riparian and appropriative rights.

A riparian right enables an owner of land bordering a natural lake or stream to take and use water on his riparian land. Riparian land must be in the same watershed as the water source and must never have been severed from the sources of supply by an intervening parcel without reservation of the riparian right to the severed parcel. Generally, a riparian water user must share the water supply with other riparian users. Riparian rights may be used to divert the natural flow of a stream but may not be used to store water for later use or to divert water which originates in a different watershed, or return flows from use of groundwater.

An appropriate right is required for use of water on nonriparian land and for storage of water. Generally, appropriative rights may be exercised only when there is a surplus not needed by riparian water users. Since 1914 new appropriators have been required to obtain a permit and license from the State.

Statements of water Diversion and Use must be filed by riparian and pre-1914 appropriative water users. The filing of a statement (1) provides a record of water use, (2) enables the State to notify such users if someone proposes a new appropriation upstream from their diversion, and (3) assists the State to determine if additional water is available for future appropriators.

The above discussion is provided for general information. For more specific information concerning water rights, please contact an attorney or write to this office. We have several pamphlets available. They include:

"Statements of Water Diversion and Use"
"Information Pertaining to Water Rights in California"
"Water Rights for Stockponds Constructed Prior to 1969"
"Appropriation of Water in California"

Holm Powerhouse Flow, AF

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1992	9283	21469	27023	44166	38301	18970	13575	12776	10717	8932	10479	16435	232126
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1992	15108	14212	15261	14678	20513	21025	16881	15039	14485	15078	10871	6924	180075
1993	7470	14102	15465	15223	22116	21180	21679	22088	21943	22407	11421	8166	203260

Lower Cherry Aqueduct Flow, AF

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
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1992	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0

STATE OF CALIFORNIA
THE RESOURCES AGENCY
STATE WATER RIGHTS BOARD

STATEMENT OF WATER DIVERSION AND USE

2636

This statement should be typewritten or legibly written in ink.

A. Name of person diverting water Hetch Hetchy Water Supply (City & County of San Francisco)

Address 425 Mason Street, San Francisco, California

B. Name of body of water at point of diversion Lake Lloyd & Lake Eleanor Reservoir *

* Connected by Eleanor-Cherry Tunnel

Tributary to Cherry and Eleanor Creeks

C. Place of diversion Lake Lloyd - N 1/2 Section 5 Township 1N, Range 19 E MDB&M
Lake Eleanor - NW ¼ Section 3, Township 1N, Range R 19 E, MD B&M,
Tuolumne County, or locate it on sketch of section grid on reverse side with regard to section lines or prominent local landmarks.

D. Name of works Lake Lloyd and Lake Eleanor Reservoirs

E. Capacity of diversion works ..... cubic feet per second / gallons per minute

Capacity of storage reservoir (Lake Lloyd) 268,800 (Lake Eleanor) 27,100 ~~gallons~~ acre-feet

State quantity of water used each month in ~~gallons~~ or acre-feet

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total Annual
1966	10,992	9,727	43,345	85,105	91,480	18,454	1,313	1,648	920	0	28,804	59,435	351,223

If monthly and annual use are not known, check months in which water was used. State extent of use in units, such as acres of each crop irrigated, average number of persons served, number of stock watered, etc. Lake Lloyd and Lake Eleanor Reservoir storage is released through Cherry Power Tunnel and flows to Dion R. Holm Powerhouse, thence returns to Cherry River.

Maximum annual water use in recent years 574,889 ~~gallons~~ acre-feet

Minimum annual water use in recent years 199,286 ~~gallons~~ acre-feet

Type of diversion facility: gravity X, pump

Method of measurement weir, flume, electric power meter, water meter, estimate, staff gage X

F. Purpose of use (what water is being used for) Power generation and flood control

G. General description or location of place of use (use sketch of section grid on reverse side if you desire)
Dion R. Holm Powerhouse (SW 1/4, Section 35, T. 1N, R. 18 E., MDB&M

H. Year of first use as nearly as known 1956

I. Name of person filing statement O. L. MOORE

Position General Manager Organization Hetch Hetchy Water Supply

Address 425 Mason Street, San Francisco 94101, California

I certify that the foregoing statements are true and correct to the best of my knowledge and belief.

O. L. MOORE, General Manager

Date signed June 30, 1967 Signature by [signature]

See Instructions on Reverse Side

SWRB 40 (6-66)

Eleanor Creek 5-811-50-00-0
Cherry Creek (Lake) 5-811-01-00-0

77750-937 9-66 30M