CHAPTER 5

EXISTING AND PROJECTED WATER AND WASTEWATER CHARACTERISTICS

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WATER SUPPLY AND ITS CHARACTERISTICS

As stated in Chapter 2, the Santa Clarita Valley water supply is obtained from local and imported water resources. Imported water resources, which constitute approximately one-half of the water supply, are provided by the valley wholesaler, the Castaic Lake Water Agency, which distributes water from the State Water Project. The balance of the water supply comes from groundwater sources. Presently, the water is pumped from two local aquifers, the Alluvial and Saugus Aquifers.

The valley is served by four retail water purveyors: the Santa Clarita Water Company, Valencia Water Company, Newhall County Water District, and Los Angeles County Waterworks District No. 36. The local purveyors obtain their supply by buying imported water from the CLWA and/or pumping groundwater. Excluding agricultural demand, the total water demand in the valley for 1995 was approximately 70,000 AFY[1].

State Water Project

Potable water provided by the SWP flows through the Sacramento-San Joaquin Delta. Measurements by the water purveyors and municipal agencies that treat and deliver SWP water to their customers indicate that concentrations of water-borne pollutants are generally low in relation to drinking water standards. Total dissolved solids levels in SWP water are also relatively low. Between 1986 and 1992, TDS concentrations in SWP water delivered by the California Aqueduct averaged 310 mg/l, as compared to the maximum allowable limit of 1,000 mg/l.

1. Estimated by the Castaic Lake Water Agency for their total service area which includes a small portion of Ventura County.

Groundwater Supplies

The major aquifers that provide water to the valley are the Alluvial and Saugus Aquifers. Together these two aquifers form the Eastern Groundwater Basin of the Santa Clara River Valley. The TDS level in this basin is approximately 500 mg/l. TDS levels can be elevated in regions impacted by irrigated agriculture, dairy or livestock activities, and, in unsewered areas, septic tanks. In general, however, the average mineral quality of water from the Alluvial and Saugus Aquifers is well below the limits specified by the RWQCB.

Contamination, where it does occur, is highly localized. Generally, the most common contaminants are industrial solvents and nitrates from agriculture. Coastal basins can exhibit high salinity and TDS levels in some regions as a result of saltwater intrusion caused by historic overdrafting of aquifers. Freshwater injection barrier wells have been employed in regions of saltwater intrusion to prevent further degradation of the aquifers. But, due to the distance from the Pacific Ocean, the Eastern Groundwater Basin is largely spared this problem.

RECLAIMED WATER

Significance to Districts' Wastewater Facilities Planning

The Districts have pursued a program of wastewater reclamation and reuse since 1962. While the distribution of reclaimed water has so far been minimally developed in the Santa Clarita Valley, reclaimed water generated at the Districts' other water reclamation plants supports a variety of beneficial reuses including landscape and agricultural irrigation, recreational impoundments, industrial cooling and process water, and groundwater recharge operations. Based on Department of Water Resources (DWR) reports, it is apparent that, as water resources become increasingly scarce in response to rising demands and declining supplies, Southern California will depend more on water reclamation and conservation to meet its needs. The uses of reclaimed water and the treatment level required in the state of California are shown in Table 5-1. The processes used to treat wastewater at the SWRP and VWRP are designed in accordance with accepted criteria for oxidation, clarification, filtration, and disinfection, and the coliform limits are the strictest required for any type of reuse. Therefore, the potential uses of effluent from the plants are many.

Existing and Future Water Reuse

In the past two decades, the Districts have witnessed a marked increase in the reuse of reclaimed water in their service areas other than the Santa Clarita Valley. Within the last 20 years, the state of California suffered through two serious droughts, and the number of reuse sites throughout the Districts' service area has increased from approximately ten sites to over 360 sites. All of the reclaimed water produced at the SWRP and VWRP is suitable for reuse. Historically, the major reason that reuse has not extensively been employed is that reclaimed water must, by law, be kept in pipelines separate from the potable water system. The cost of constructing separate distribution systems to deliver reclaimed water to widespread locations for reuse can, in certain areas, be prohibitive. Additionally, demand for landscape irrigation, one of the most common uses of reclaimed water, is largely seasonal, sometimes requiring storage. However, the impending shortfall of water supply in the valley will require that local water supply agencies consider reclaimed water as an alternative source.

Currently, the use of reclaimed water is almost non-existent in the valley. In fact, no reclaimed water distribution or storage system exists. The CLWA, however, forecasts a shortfall in water supply occurring in 2006 (see Chapter 2, Figure 2-10) and in the year 2010 the potential shortfall is expected to approach 16,500 AFY (14.7 mgd) of water. Accordingly, in 1993 the CLWA developed a *Reclaimed Water System Master Plan* (RWSMP) for the Santa Clarita Valley. The RWSMP includes plans for storage and conveyance of reclaimed water as well as identification of users and uses for reclaimed water.

In the proposed reclaimed water system, Districts Nos. 26 and 32 would provide in excess of 9,000 AFY (8.0 mgd) from the SWRP and VWRP to the CLWA. The identified uses include:

- Golf Courses
- Parks
- Schools
- Landscaping
- Recreational
- Industry

The proposed reclaimed water system is projected to cost $33 million (1993 dollars) and is scheduled to be completed in the next 10 to 15 years. In accordance with the RWSMP, Districts Nos. 26 and 32 and CLWA have negotiated agreements to allow CLWA to begin to distribute reclaimed water. Accordingly, a site has been reserved at the VWRP for a reclaimed water pump station. Also, in December 1995, Districts Nos. 26 and 32 executed a contract with CLWA that allows for the distribution of 1,600 AFY (1.4 mgd) of reclaimed water from the VWRP; 1,600 AFY represents less than 10 percent of the total SCVJSS flow. This flow corresponds to Phase 1 of CLWA's RWSMP and has been reserved for landscape irrigation at a number of areas within a few miles of the VWRP.

Effluent Water Quality

The reuse potential of reclaimed water is directly influenced by the quality of the water supply. Conventional wastewater treatment processes such as those employed at the SWRP and VWRP have

Table 5-1
STATE OF CALIFORNIA TREATMENT REQUIREMENTS FOR REUSE

TYPE OF USE	MINIMUM TREATMENT REQUIRED
Fodder, Fiber, & Seed Crops Surface Irrigation of Orchards and Vineyards	Primary
Pasture for Milking Animals Landscape Impoundments Landscape Irrigation (Golf Courses, Cemeteries, etc.)	Oxidation & Disinfection
Surface Irrigation of Food Crops Restricted Landscape Impoundments	Oxidation & Disinfection (with reduced coliform)
Spray Irrigation of Food Crops Landscape Irrigation (Parks, Schools, etc.) Nonrestricted Recreational Impoundments	Oxidation, Clarification, Filtration, & Disinfection
Groundwater Recharge	Case-by Case Evaluation

very little effect on certain water quality parameters, including nutrient and mineral quantity.

The mineral content of the water supply, which is generally expressed in terms of the total dissolved solids level, is also one of the constituents of concern. High TDS levels in the water supply are directly translated to high TDS levels in reclaimed water, which tend to limit available reuse options. Excessive TDS levels in reclaimed water may cause damage to some sensitive plant species, thus limiting irrigation applications. In addition, higher TDS may cause industrial process fouling or inefficiencies that could limit industrial applications.

As a result of higher chloride concentrations in the water supply, the SCVJSS facilities in the late 1980s and early 1990s witnessed elevated chloride levels. In general, however, TDS levels at the SWRP and VWRP are considered to be moderate (in the 600 to 900 mg/l range).

The quality of the water supply is, therefore, relevant to Districts' facilities planning. The viability of future reuse applications depends on the delivery of a high quality water supply to the region served by the WRPs. Table 5-2 summarizes the effluent quality for selected constituents at the SWRP and VWRP and compares that to the maximum limitation specified by the NPDES permits issued to the SWRP and VWRP. In addition to the limits for the constituents shown in Table 5-2, the NPDES permits specify upper and lower limits for effluent pH and limits for effluent temperature, radioactivity, coliform, toxicity, and turbidity.

Effluent Ammonia

Ammonia levels and the associated toxicity is a concern because the treated effluent is discharged to the Santa Clara River where elevated ammonia concentrations could be detrimental to aquatic life. The RWQCB, through NPDES permit conditions, has given Districts Nos. 26 and 32 until June 2003 to either meet the new receiving water objectives for ammonia or to conduct studies leading to an approved, less restrictive site specific objective for ammonia.

Preliminary chronic toxicity studies on the Santa Clara River have indicated a likely toxic effect due to the WRPs' discharges. The laboratory toxicity tests are conducted using EPA-specified surrogate fish species in ambient river water sampled from downstream of the WRPs. The toxicity studies further indicate that a large part of the observed toxicity may be due to the presence of ammonia.

Table 5-2
1996 AVERAGE EFFLUENT QUALITY VERSUS DISCHARGE LIMITATIONS[a]

CONSTITUENT	AVERAGE EFFLUENT QUALITY		NPDES DISCHARGE LIMITS[b]
	SAUGUS WRP	VALENCIA WRP	
Total Dissolved Solids (mg/l)	681	797	1000
Chloride (mg/l)	110	135	100[c]
Sulfate (mg/l)	151	187	450
Boron (mg/l)	1.02	0.92	1.5
Detergents (mg/l)	0.15	0.18	0.5
Fluoride (mg/l)	0.43	0.49	1.6
Nitrate+Nitrite Nitrogen (mg/l)	4.15	6.47	10
BOD_5 (mg/l)	8	4	20
Suspended Solids (mg/l)	2	2	15
Settleable Solids (ml/l)	< 0.1	< 0.1	0.1
Oil and Grease (mg/l)	< 1.6	< 1.0	10
Antimony (mg/l)	< 0.0005	0.002	0.006
Arsenic (mg/l)	<0.001	< 0.001	0.05
Barium (mg/l)	0.03	0.02	1
Beryllium (mg/l)	< 0.01	< 0.005	0.004
Cadmium (mg/l)	< 0.003	< 0.003	0.005
Chromium (mg/l)	< 0.01	< 0.01	0.05
Cyanide (mg/l)	< 0.01	< 0.01	0.0052
Iron (mg/l)	0.02	0.07	0.3
Lead (mg/l)	< 0.02	< 0.02	0.05
Mercury (mg/l)	< 0.0001	< 0.0001	0.002
Nickel (mg/l)	< 0.02	< 0.02	0.1
Selenium (mg/l)	< 0.001	< 0.001	0.01
Silver (mg/l)	< 0.01	< 0.01	0.05
Zinc (mg/l)	0.04	0.04	5
Coliform Group (MPN/100 ml)	< 1	< 1	2.2[d]
Turbidity (NTU)	1.2	1.4	2
pH	7.4	7.0	6.0-9.0

Notes:
a) Does not include pesticides and trace organics.
b) The stated limit is a daily maximum for the first seven constituents (through Nitrogen) listed and a 30-day average maximum for the remaining constituents, unless otherwise indicated.
c) The RWQCB has set an interim chloride limit of 190 mg/l (Resolution 97-002) pending further study of the appropriate discharge limit to protect the beneficial uses of the river.
d) Maximum seven-day average value.

Effluent Chloride

Another issue that the Districts have committed to study and that could affect effluent quality is chlorides. Chloride contributions from the SWRP and VWRP effluent is a concern for downstream water suppliers and users. The 1996 average chloride concentrations in SWRP and VWRP discharges were 110 mg/l and 135 mg/l, respectively.

The existing Basin Plan, adopted in 1975, assumed a constant background level of chlorides in the water supply. As such, the Basin Plan specified a maximum chloride level of 100 mg/l in its NPDES permits.

However, the level of chlorides in the water supply has fluctuated with a net increase since that time. Increases in chloride concentrations have been attributed to drought conditions in the 1980s and the increase in use of imported water supply, which has a relatively higher chloride concentration.

As a consequence, many dischargers, including the SCVJSS facilities, have been unable to consistently meet the 100 mg/l chloride standard. As a short-term measure, in 1990, the RWQCB adopted Resolution 90-004, which stated that the maximum chloride limit was to be set at the lower of 250 mg/l or the concentration in the water supply plus 85 mg/l. The resolution was intended to be an interim measure, providing relief for dischargers in the short-term.

When Resolution 90-004 expired in February 1997, the RWQCB adopted a Resolution 97-002 that established another interim chloride limit of 190 mg/l with special provisions for evaluation of appropriate chloride objectives and the development of a cost-effective means to protect the waters for irrigation in the Santa Clara River watershed. Accordingly, the RWQCB will be working with representatives from affected and responsible agencies, including the Districts, to establish appropriate long-term water quality objectives for chlorides discharged to the river and to provide a permanent solution to chloride compliance concerns.

The study will focus on the evaluation of appropriate chloride objectives for irrigation, surface waters, groundwaters, and development of cost-effective means to protect the beneficial uses of affected waters. The chloride-related water quality objectives for the Santa Clara River watershed will be considered for revision by the year 2001, when the NPDES permits for this watershed are scheduled for renewal. Any new chloride objective will need to consider chloride levels in supply waters (including fluctuations due to drought conditions), reasonable loading factors during beneficial use and disinfection of supply waters and wastewaters, and the cost-effectiveness of advanced treatment technology capable of removing chloride. When a determination is made, any necessary modifications to the SCVJSS facilities will be implemented and detailed in subsequent documentation.

Demand/Supply Balance Between the SWP, Groundwater Sources, and Reclaimed Water

In the *Reclaimed Water System Master Plan*, the CLWA forecasts a shortfall in the supply of water to valley residents and industry. Based on current population projections, the shortfall is projected to occur in 2006, even with an assumption of 10 percent conservation. This timeline is predicated, however, on the availability of SWP water. Past history has indicated that in drought years SWP water can be drastically reduced, despite entitlements to the contrary. In fact, an iterative model of water supply has projected that the CLWA may receive as little as 20 percent of its entitlement of 41,500 AFY (37.0 mgd) in a drought year.[2]

To mitigate this shortfall, the CLWA has proposed to use reclaimed water from the SWRP and VWRP. The total proposed project will deliver over 9,000 AFY (8.0 mgd) as mentioned previously, with a peak day demand of 18 mgd. The proposed project includes pump stations, storage reservoirs, and pipelines to deliver the reclaimed water, and is estimated to be complete around 2010. The final amount of water

2. Based on an iterative model created by Glenn Reiter & Associates for 1993, the last drought year on record.

available for reuse at the SWRP and VWRP is a function of the ultimate capacities of the plants, user demand, and any limitations on diversion of effluent flow from the Santa Clara River.

Meeting Additional Demand

In future years, the demand for and relative value of reclaimed water will be largely dependent on the cost of alternative supplies. Since all new water supply to Southern California most likely will be imported, and given possible constraints on the availability of SWP water supplies, it can be assumed that the marginal cost of additional water will be significantly higher than the present wholesale rate. In addition, the capacity and reliability of existing water supply sources (the SWP in particular) have recently been reduced in response to environmental pressures. As a result, water wholesalers are expected to increase the price for water as it becomes necessary to utilize increasingly expensive water resources.

The economic viability of reclaimed water increases as the cost of alternative potable water supplies (groundwater and SWP water) increases. Therefore, because the price of groundwater and SWP water is expected to increase, while the price of producing and delivering reclaimed water is expected to remain relatively constant, water reuse projects are expected to become more economically attractive.

Secondary Benefits of Water Reuse

In addition to augmenting potable water supplies, the use of reclaimed water has several other benefits. First, water reuse lowers treatment expenses by reducing dechlorination and defoamant costs. Reclaimed water that is pumped to a distribution system does not need to be dechlorinated or have defoamant added, whereas effluent that is discharged to rivers must be partially or fully dechlorinated and treated to prevent foaming in the river. Secondly, the Districts derive income from the sale of reclaimed water. Although this is generally only a small percentage of the total wastewater budget, the revenue from the sale of reclaimed water could become significant in the future as the value of water increases, which in turn would reduce the net cost of wastewater management.

Water reuse also provides environmental benefits to the region and state. Because the use of locally-produced water reduces the need to pump imported water supplies over long distances, energy is conserved. Furthermore, use of reclaimed water allows for the secondary environmental benefits associated with reduced imports of water, such as less diversion of instream flows. Energy and petroleum products are also conserved due to the decrease in fertilizer use for users of nutrient rich reclaimed water. Besides conserving resources, reductions in energy use also result in reductions of air emissions.

WASTEWATER CHARACTERISTICS

Wastewater is characterized in terms of its physical, chemical, and biological composition, and the inter-relation between these three characteristics. The character of the wastewater has many implications for the wastewater treatment process, and, therefore, on the quality of effluent discharged or reused from the plant.

Toxic Pollutants

Priority pollutants are identified by the EPA because of their known or suspected carcinogenity, mutagenicity, teratogenicity, or high acute toxicity. Metals are important constituents of wastewater which, in limited quantities, aid the treatment process and prevent corrosive acid build-up in conveyance systems. Many metals, however, are also classified as priority pollutants because of their toxicity at higher concentrations.

Priority pollutants and metals in the influent wastewater are of particular concern to the Districts because of their regulatory and operational implications. From a regulatory standpoint, priority pollutants and metals in the effluent are subject to NPDES limits due to their potential significant environmental effects. Second, excessive levels of priority pollutants or metals can upset the biological processes used at the WRPs.

Since conventional treatment does not significantly remove some of these constituents and since their presence in the influent could cause operational impacts, priority pollutants and metals in the effluent are largely controlled through the Districts' pretreatment program for industrial dischargers. Due to this program, the presence of trace metals and priority pollutants in SCVJSS wastewater is minimal. The pretreatment program, as discussed in Chapter 3, regulates all major sources of industrial waste discharged to SCVJSS sewers. The majority of metals and priority pollutants in industrial wastewater, therefore, are controlled at the source prior to discharge to the SCVJSS. After treatment, all reclaimed water produced at these plants meets drinking water standards for all chemical constituents for which standards are promulgated.

Influent Characteristics

Influent characteristics, including those of some priority pollutants and metals, for both SCVJSS treatment plants are presented in Table 5-3. Concentrations of total suspended solids (TSS) and biochemical oxygen demand (BOD) are typically higher at the VWRP because the VWRP influent includes all primary sludge and skimmings from the SWRP.

Table 5-3
1996 SCVJSS INFLUENT DATA

INFLUENT CONSTITUENT	UNITS	SCVJSS TREATMENT PLANTS	
		SWRP	VWRP
TSS	mg/l	316	353
BOD	mg/l	232	253
Cyanide	mg/l	< 0.01	< 0.01
Antimony	mg/l	< 0.0005	0.0038
Barium	mg/l	0.09	0.07
Beryllium	mg/l	< 0.01	< 0.01
Cadmium	mg/l	< 0.003	< 0.003
Chromium	mg/l	< 0.01	< 0.01
Copper	mg/l	0.16	0.05
Lead	mg/l	< 0.02	0.02
Manganese	mg/l	0.03	0.04
Mercury	mg/l	0.0003	0.0005
Nickel	mg/l	< 0.02	< 0.02
Selenium	mg/l	0.0017	0.0014
Silver	mg/l	< 0.01	< 0.01
Thallium	mg/l	< 0.002	< 0.002
Zinc	mg/l	0.67	0.20
DDT[a]	µg/l	0.0	0.0

Note: a) Dichloro-Diphenyl-Trichloroethane (DDT).

EXISTING FLOWS AND CAPACITIES

The design capacity of a treatment plant is defined in terms of the annual average dry-weather flow that a plant is designed to treat. The design capacity of a treatment plant is normally used by the RWQCB to establish NPDES permit limits. The existing wastewater flow (1996 calendar mean) and the design capacity of each of the SCVJSS treatment plants are shown in Table 5-4.

Table 5-4
SCVJSS FLOWS AND CAPACITIES

SCVJSS TREATMENT PLANTS	FLOWS (mgd)	DESIGN CAPACITY (mgd)
Valencia WRP	9.3	12.6
Saugus WRP	5.7	6.5
SCVJSS TOTAL	**15.0**	**19.1**

DEMOGRAPHIC DATA

Demographic data for the SCVJSS service area was obtained from SCAG, the Metropolitan Planning Organization for the region. SCAG's latest adopted forecast is the 1994 projections. The most recent forecast was developed by SCAG in 1996 and is referred to as SCAG 96; however, it has not yet been adopted. Both forecasts were developed through the SCAG subregional planning process and reflect local jurisdictions' general plans and forecasts.

The SCVJSS population figures were derived for both the 1994 and 1996 forecasts for the years 2000, 2010, and 2015. The more recent SCAG 96 forecast is used for the flow projections in this plan. Although the SCAG 96 forecast has not been officially adopted at the time of this documents's release, use of SCAG 96 data has been determined to be acceptable for planning purposes since the 1996 forecast does not exceed the adopted 1994 forecast and is, therefore, within the envelope of the 1994 forecast.

SCAG developed the SCAG 96 population figures on a subregional level, as shown in Table 5-5, based on census tract level data. The SCVJSS service area is within the North Los Angeles County subregion. This subregion is shown in Table 5-5 (bold and italics). Subregional boundaries are shown in Figure 5-1.

Table 5-5
SCAG 96 FORECAST BY SUBREGIONS

SUBREGIONS	POPULATION			
	1994	2000	2010	2015
North Los Angeles[a]	***451,374***	***595,899***	***877,276***	***1,032,433***
Los Angeles City	3,656,727	3,847,905	4,298,926	4,578,712
Las Virgenes Malibu Conejo Council	75,283	81,740	94,516	100,354
Arroyo Verdugo	537,977	556,845	604,264	647,404
San Gabriel Valley COG	1,482,110	1,567,039	1,673,873	1,728,896
West Side Cities	226,972	233,678	242,470	248,109
South Bay Cities COG	818,992	857,709	884,533	902,803
Gateway Cities COG	1,982,105	2,086,853	2,196,912	2,275,588
Orange County	2,595,147	2,739,329	3,022,584	3,165,447
Western Riverside COG	1,127,462	1,367,271	1,818,892	2,081,165
Coachella Valley	249,416	300,224	354,244	389,904
VCOG	709,758	712,629	804,329	861,563
San Bernardino	1,558,345	1,874,789	2,322,108	2,581,096
Imperial	138,470	148,983	207,307	240,813
SCAG Total[b]	**15,610,100**	**16,970,900**	**19,402,200**	**20,834,300**
Counties:				
Los Angeles	9,231,545	9,827,661	10,872,791	11,514,299
Orange	2,595,147	2,739,329	3,022,584	3,165,447
Riverside	1,376,878	1,667,496	2,173,141	2,471,063
San Bernardino	1,558,345	1,874,789	2,322,108	2,581,096
Ventura	709,758	712,629	804,329	861,563
Imperial	138,470	148,983	207,307	240,813
SCAG Total[b]	**15,610,100**	**16,970,900**	**19,402,200**	**20,834,300**

Source: Southern California Association of Governments.
Note: a) Includes the SCVJSS service area.
b) Rounded to the nearest hundred.

Table 5-6
1994 SCAG DISAGGREGATED POPULATION BY CENSUS TRACTS FOR THE SCVJSS SERVICEAREA

1990 CENSUS TRACTS	% of 1990 POPULATION IN DISTRICT	1990 POPULATION IN DISTRICT	% of 2000 POPULATION IN DISTRICT	2000 SEWERED POPULATION	% of 2010 POPULATION IN DISTRICT	2010 SEWERED POPULATION	% of 2015 POPULATION IN DISTRICT	2015 SEWERED POPULATION
910801	40%	4,176	69%	14,764	76%	21,957	79%	27,112
910802	0%	—	1%	118	2%	275	3%	451
920003	90%	9,518	92%	18,781	94%	28,963	94%	34,646
920011	100%	8,638	97%	14,128	97%	18,998	97%	22,329
920012	100%	13,398	98%	20,112	98%	26,043	99%	29,745
920013	100%	3,733	97%	15,755	97%	19,045	97%	23,633
920021	75%	7,569	86%	18,726	90%	30,612	91%	37,290
920022	100%	4,453	97%	4,612	98%	5,305	98%	5,632
920023	100%	1,996	97%	2,022	97%	2,171	97%	2,236
920024	100%	2,960	97%	2,969	97%	3,057	97%	3,100
920025	100%	11,691	97%	13,447	97%	15,117	97%	16,094
920101	100%	7,393	99%	19,403	99%	32,012	99%	39,463
920102	75%	8,027	91%	29,849	95%	50,600	96%	63,101
920200	1%	52	2%	200	3%	328	4%	456
920311	60%	7,901	63%	8,395	67%	9,932	69%	10,803
920312	100%	4,284	97%	8,951	97%	20,433	97%	25,186
920313	100%	5,315	97%	5,201	97%	5,281	97%	5,277
920321	100%	10,936	97%	9,891	97%	10,492	97%	10,655
920322	100%	2,803	97%	2,765	97%	2,866	97%	2,921
920324	100%	10,691	97%	11,980	98%	13,540	98%	14,351
920325	100%	1,701	100%	37,836	58%	64,544	67%	95,577
930200	0%	—	1%	16	2%	44	3%	80
Total		**125,235**		**259,921**		**381,617**		**470,139**

Source: Derived from the Southern California Association of Governments, 1994 RCPG.

According to SCAG 96, the population of Los Angeles County in the year 2015 is expected to be approximately 12 million. Approximately 2.7 percent of this total, or 321,000 people, will reside within the SCVJSS projected service area. This represents a 137 percent increase in the SCVJSS service area population between 1994 and 2015.

The current SCVJSS service area consists of the City of Santa Clarita and surrounding unincorporated areas. As the population centers expand outward, the service area will be expanded to accommodate the new development. Based on this trend, the SCVJSS service area will, by the year 2015, incorporate a much larger service area than is presently being served. To the north, northeast, and southeast, growth is limited by the Angeles National Forest (see Figure 5-2). The westerly extent of the service area is the Los Angeles/Ventura County line. To the east, the service area can accommodate growth along the Antelope Valley Freeway.

The population figures were estimated for the SCVJSS by disaggregating available census tract data. Disaggregation allowed a more accurate count through the use of certain assumptions for attributing

Table 5-7
SCAG 96 DISAGGREGATED POPULATION BY CENSUS TRACTS FOR THE SCVJSS SERVICE AREA

1990 CENSUS TRACTS	% of 1994 POPULATION IN DISTRICT	1994 POPULATION IN DISTRICT	% of 2000 POPULATION IN DISTRICT	2000 SEWERED POPULATION	% of 2010 POPULATION IN DISTRICT	2010 SEWERED POPULATION	% of 2015 POPULATION IN DISTRICT	2015 SEWERED POPULATION
910801	40%	4,384	58%	9,328	68%	14,722	73%	18,706
910802	0%	—	1%	111	2%	241	3%	391
920003	90%	10,364	90%	13,403	93%	21,845	94%	26,137
920011	100%	9,248	97%	11,657	97%	14,952	97%	17,499
920012	100%	14,459	98%	17,645	98%	22,562	98%	25,355
920013	100%	4,071	98%	8,892	98%	14,267	98%	16,972
920021	75%	8,172	80%	12,334	87%	21,134	89%	26,177
920022	100%	4,856	97%	5,034	97%	5,641	98%	5,989
920023	100%	2,177	97%	2,220	97%	2,364	97%	2,432
920024	100%	3,228	97%	3,279	97%	3,410	97%	3,483
920025	100%	12,677	97%	13,621	97%	15,018	97%	15,991
920101	100%	7,935	98%	9,846	99%	21,334	99%	27,618
920102	75%	8,339	85%	17,476	82%	27,995	74%	33,072
920200	1%	54	2%	188	3%	292	4%	393
920311	60%	7,494	62%	8,479	65%	10,014	67%	10,762
920312	100%	4,697	97%	6,883	98%	14,535	98%	17,616
920313	100%	5,796	97%	5,828	97%	5,992	97%	6,086
920321	100%	10,836	97%	11,001	97%	11,691	97%	12,025
920322	100%	3,056	97%	3,083	97%	3,208	97%	3,278
920324	100%	11,671	97%	12,407	98%	13,787	98%	14,441
920325	100%	1,768	100%	13,009	20%	11,777	44%	36,430
930200	0%	—	1%	16	2%	44	3%	80
Total		**135,281**		**185,740**		**256,826**		**320,933**

Source: Derived from the Southern California Association of Governments 1996 data.

future growth to the service area for a given year. Disaggregation in this case allowed large areas to be subdivided in order to more accurately determine the existing and future population for a given area. This was necessary since SCAG provides demographic data on a census tract level. The detailed disaggregation of the population by census tracts is provided in Tables 5-6 and 5-7 for the 1994 and 1996 forecasts, respectively.

For the existing population, each individual census tract was examined to estimate the percentage of the population of the census tract that lies within the current Districts Nos. 26 and 32 service area. For the projected population, the general assumption was that all the projected growth minus septic usage will be tributary to the SCVJSS's treatment facilities. However, for census tracts that are currently 100 percent within Districts Nos. 26 and 32 and are close to the center of the city, 100 percent of the growth was allocated to the SCVJSS without subtracting septic usage, since it is unlikely that any new structures within those census tracts will use septic tanks given the availability of an extensive sewer system. Similarly, for census tracts that are known to have large new developments planned, 100 percent of the growth was also allocated to the SCVJSS because sewer service will be a requirement for their development.

On the other hand, there are portions along the outskirts of the SCVJSS service area that are sparsely populated due to the semi-rural character of the area. These sparsely populated areas lack a sewerage system, and consequently, the resident population there utilizes septic tanks. These remote census tracts, such as census tract 910802 (see Figure 5-2), were assumed to have only a portion of the new development connected to the SCVJSS. Consequently, the projections for these remote census tracts were estimated separately based on the following assumptions of tributary growth.

For new proposed developments that will not be sewered by the SCVJSS, the population was deducted from the corresponding census tracts. One such development, Newhall Ranch, is a proposed community that will be located at the southwestern region of the Santa Clarita Valley. As proposed, it will include its own 7.7 mgd WRP as part of its sewerage system. The proposed Newhall Ranch WRP will be located at the Los Angeles/Ventura County line, adjacent to the Santa Clara River.

Currently, the percent sewered within the general service area is assumed to be 97 percent since approximately three percent of the population is believed to utilize septic tanks. As new growth develops, the proportion of the population on septic tanks will likely decrease since most, if not all, of the new development will be connected to the sewer system. However, there will always be developments that will not connect to the SCVJSS due to topography or the prohibitive cost of providing the necessary infrastructure. As a result, there will still be septic tank usage within the remote census tracts. Therefore, for the remote census tracts within the planning area, a conservative assumption was made that two percent of new growth will rely on septic tanks, and 98 percent of the new growth will be tributary to the SCVJSS. The percentages shown for the remote census tracts for the years 2000, 2010, and 2015 were calculated by dividing the resulting disaggregated population (which took into account the two percent septic use) by the total population for that census tract given by SCAG (not shown in Tables 5-6 and 5-7).

METHODOLOGY USED TO ESTIMATE WASTEWATER FLOW FROM POPULATION DATA

Forecasts of average daily flow rates are necessary to establish the design capacity and the hydraulics of wastewater treatment facilities. Estimates of future peak flows, in addition to average flows, are also required to design treatment facilities. Peak flows may be derived from average flows by applying a peak to average ratio factor, which is based on historical data. The methodology for developing average flows for the SCVJSS is explained in this section.

Generally, in order to predict future average daily flows, the following factors must be considered: infiltration and inflow (I/I), the portion of municipal water supply reaching the collection system as wastewater, permanent water conservation measures, current and historical flows, industrial waste flows, and residential/commercial flows. These factors contribute to the derivation of the per capita wastewater generation rate. The per capita generation rate is then applied to the projected population to estimate future average wastewater flows.

Infiltration/Inflow

Infiltration occurs when groundwater enters the sewer system through cracks, holes, pipe connections, etc. The EPA has established a threshold flow rate of

120 gallons per capita per day during periods of high groundwater as indicative of excessive infiltration. Groundwater levels are generally low throughout the SCVJSS service area, and sewers are generally constructed above the water tables. In California, the groundwater table generally rises during the winter months, defined as October through April. In the last decade, the highest rainfall occurred in 1992-93. The average SCVJSS flow during that winter was 14.34 mgd. Dividing this flow by the SCVJSS sewered population of 138,808 for the 1992-93 winter results in a per capita generation rate of 103 gpcd. This rate falls significantly below the threshold value of 120 gpcd, and, therefore, infiltration was assumed to be insignificant.

Inflow, on the other hand, is a result of excessive drainage into a sewer, and usually occurs during and after storms through manholes or from other sources that drain into the sewer system. The EPA has established a threshold flow rate of 275 gpcd during storm events for induced peak inflow rates as the definition of excessive inflow.

The SCVJSS treatment plants do not receive or treat storm runoff, since storm runoff is managed via a separate storm drain system. Inflow to the SCVJSS through manholes during storms does, however, contribute additional flow to the SCVJSS. The normal rainfall in Southern California is relatively low. Influent rates at SCVJSS treatment plants were monitored during several storm events, which occurred between 1990 and 1993 and ranged between two and six inches of rainfall (see Table 5-8). Wet weather flow indicates flow occurring during a storm. During these storms, the SCVJSS experienced a 4 to 36 percent increase in average flow and a 9 to 30 percent increase in peak flow, due mainly to inflow through manhole covers. By dividing the wet weather peak flow by the population, it was determined that the highest per capita generation rate to occur was 210 gpcd (in 1992), which is significantly below the threshold value of 275 gpcd.

It should be noted that flows identified in Table 5-8 do not represent instantaneous system peak flows but rather the sum of peak flows that occurred at each SCVJSS treatment plant. These peaks occur at different times at different plants. Since instantaneous peaks are lower, using the sum of peak flows in Table 5-8 is conservative. This would indicate that the per capita peak flow generation rate is actually lower than 210 gpcd, and that there is no excessive inflow in the SCVJSS.

Water Conservation

Water conservation measures implemented by local jurisdictions during the recent drought in Southern California, coupled with the recent economic recession, have resulted in reduced wastewater flows in many areas of Southern California. The SCVJSS service area has also been affected, but not as severely as other areas in Southern California. The wastewater per capita generation rate did decline, but not for as many years as it did in the Los Angeles metropolitan area.

Water Supply

In general, a considerable portion of the municipal water supply (including water used for manufacturing, landscape irrigation, and fire fighting; leakage from water mains and service pipes; and water used by consumers who rely on septic systems) does not reach the sanitary sewer system. The total portion of the municipal water supply which reaches the collection system as wastewater in semiarid regions of the southwestern United States has been estimated between 60 and 65 percent of the total supply consumed (Metcalf and Eddy, 1991). The methodology used to estimate average daily wastewater flows to the SCVJSS did not require an assumption of the proportion of the municipal water supply that reaches the collection system, since actual flows are metered.

Table 5-8
SCVJSS INFLOW DATA

STORM PERIOD	TOTAL RAINFALL (inches)	DAILY FLOW DRY (mgd)	DAILY FLOW WET (mgd)	DAILY FLOW INCREASE (%)	PEAK FLOW DRY[a] (mgd)	PEAK FLOW WET (mgd)	PEAK FLOW INCREASE (%)	SEWERED POPULATION	WET PER CAPITA GEN. RATE (gpcd)
Feb. 07-08, 1993	2-4	15.11	18.08	20	24.10	26.20	9	138,808	189
Jan. 15-18, 1993	3-6	16.04	17.99	12	23.95	25.73	7	138,808	185
Feb. 10-12, 1992	2-5	14.21	19.37	36	22.17	28.73	30	137,070	210
Feb. 16-17, 1990	2-4	15.09	15.76	4	23.55	25.15	7	121,478	207

Note: a) Dry peaks given are for the most recent non-rain period occurring prior to the storm, on the same days of the week as the storm, and for the same duration as the storm.

Table 5-9
SCVJSS RESIDENTIAL/COMMERCIAL PER CAPITA GENERATION RATE

	YEAR							
	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95
Total Metered Flow (mgd)[a]	10.69	11.50	12.29	12.66	13.54	14.72	15.37	15.71
Industrial Flow (mgd)	-0.28	-0.26	-0.30	-0.31	-0.28	-0.33	-0.33	-0.35
Total Res/Com Flow (mgd)	**10.41**	**11.24**	**11.99**	**12.35**	**13.26**	**14.39**	**15.03**	**15.36**
Total Population	103,446	109,780	125,235	139,518	141,310	143,101	151,751	151,117
Percent Sewered	x 0.97	x 0.97	x 0.97	x 0.97	x 0.97	x 0.97	x 0.97	x 0.97
Sewered Population	**100,343**	**106,487**	**121,478**	**135,332**	**137,070**	**138,808**	**147,198**	**146,583**
Res/Com Per Capita[b] Generation Rate (gpcd)	**104**	**106**	**99**	**91**	**97**	**104**	**102**	**105**
Average (gpcd)	**101**							

Sources: Total Population:
1987-90: Los Angeles County Department of Regional Planning.
1990-95: Population Estimates for California Cities and Counties, California Department of Finance.

Notes: a) Flows represent the twelve-month average of the fiscal year.
b) Per Capita Generation Rate = (Residential + Commercial Flow) ÷ Sewered Population.

Per Capita Generation Rate

An adjustment for the portion of the population using septic tanks was incorporated in the calculation of the per capita generation rate. As discussed previously, it is assumed that approximately three percent of the SCVJSS population currently uses septic tanks for wastewater disposal. This percentage of the population was subtracted from the total SCVJSS population in order to calculate the per capita generation rate.

The SCVJSS per capita generation rate used in the 2015 Plan was calculated by averaging per capita wastewater generation rates derived from historical wastewater flows measured during eight consecutive fiscal years between 1987-88 and 1994-95 as shown in Table 5-9. The per capita generation rate represents the average discharge of wastewater per person within the SCVJSS service area. This includes residential and commercial users, but excludes septic users and industrial flows. The per capita generation rate is averaged over the past eight years in order to obtain a rate that may be more indicative of future rates and should represent permanent conservation levels for the projected planning period. The total metered flows shown in Table 5-9 are the metered effluent flows for the SCVJSS WRPs, averaged over a 12-month period for the fiscal year shown. Industrial waste flows are the sum of the reported flows from all industrial users that discharge more than one million gallons per year to the SCVJSS during that fiscal year. The percent sewered is assumed to be 97 percent, since an estimated three percent of the SCVJSS population utilizes septic tanks for wastewater disposal. Based on this information, the estimated average per capita generation rate for the SCVJSS is 101 gpcd, as shown in Table 5-9.

REQUIRED CAPACITY PROJECTED FOR THE SCVJSS

The wastewater flow projections for the SCVJSS are based on an 18-year planning horizon (1997-2015). Districts Nos. 26 and 32 must ensure that the WRPs and conveyance system of the SCVJSS will have the capacities required to accommodate the projected 2015 flow as well as the interim flows throughout the planning horizon.

Calculation of Projected Wastewater Flow

The projected wastewater flows for the years 2000, 2010, and 2015 were calculated by employing a flow estimation method outlined in the Policy For Implementing The State Revolving Fund For Construction of Wastewater Treatment Facilities (95-1 CWP, February 1995). This method utilizes the following assumptions:

- The residential/commercial wastewater generation rate is constant.
- The industrial waste (IW) component shall include the current IW flow plus projected future IW flow based on an appropriate method.

Projected 2000, 2010, and 2015 wastewater flows for the SCVJSS may, therefore, be calculated using the formula shown in Table 5-10. The projected population and the per capita generation rate shown in that formula were derived in previous sections of this chapter. The industrial growth factor is based on an eight-year regression, as shown in Figure 5-3, because a regression using only the most recent two to three years is not necessarily indicative of historical patterns. An alternative method is to develop the IW projection based on SCAG's industrial projections contained in the *1994 Regional Comprehensive Plan and Guide* (RCPG). This projection is the product of employment and productivity ratios identified by SCAG for the following industrial sectors: construction, manufacturing, and transportation, communication, utilities (TCU) as shown in Table 5-11. The result is a 55 percent increase (2.5 percent increase per year) in total output changes by these three sectors between 1990 and 2010.

The increase in industrial wastewater flows, however, is not expected to be directly proportional to total output for these industrial sectors. This is due to the anticipated increase in future water conservation and recycling measures utilized for cost savings as well as reduction in the number of employees resulting from the implementation of new technology and automation, as shown in Table 5-11. Consequently, it was assumed that only 85 percent of the 55 percent total output increase would translate into increased industrial flows. The result is a 47 percent increase in projected industrial wastewater flows. If this increase is applied to the 1990 IW flow for the SCVJSS, the result would be 0.47 mgd for the year 2010 and 0.52 mgd for the year 2015. The difference between the IW regression and SCAG's projection is a mere

0.04 mgd (0.56-0.52). Since SCAG's projection is for the entire county and is not necessarily indicative of a relatively smaller area such as the SCVJSS service area, the IW regression was used in the 2015 Plan for estimating future industrial wastwater flows.

The entitlement flow shown in the formula in Table 5-10 is the allocation of 1.3 mgd of capacity to the Peter W. Pitchess Honor Rancho provided under the Waste Water Capacity Agreement. This entitlement flow, which must also be accounted for in the SCVJSS flow projections, was assumed constant throughout the planning horizon.

Sensitivity Analysis

The SCVJSS wastewater flow projection of 34.2 mgd is shown in Figure 5-4. This figure indicates that if no treatment plant expansions are provided, the demand for wastewater treatment in the SCVJSS will

Table 5-10

PROJECTED FLOW FORMULA AND CALCULATIONS

PROJECTED FLOW		[RES/COM RATE x PROJECTED POPULATION]		[PROJECTED IW FLOW]		[ENTITLEMENT FLOW]
2000 Flow	=	[101 gpcd x 185,740]	+	[400,000 gpd]	+	[1,300,000 gpd]
	=	18.7 mgd	+	0.4 mgd	+	1.3 mgd
	=	**20.4 mgd**				
2010 Flow	=	[101 gpcd x 256,826]	+	[510,000 gpd]	+	[1,300,000 gpd]
	=	25.9 mgd	+	0.5 mgd	+	1.3 mgd
	=	**27.7 mgd**				
2015 Flow	=	[101 gpcd x 320,933]	+	[560,000 gpd]	+	[1,300,000 gpd]
	=	32.3 mgd	+	0.6 mgd	+	1.3 mgd
	=	**34.2 mgd**				

Table 5-11

SCAG'S INDUSTRIAL PROJECTIONS FOR LOS ANGELES COUNTY

	EMPLOYMENT (x1000)			PRODUCTIVITY (output/hr/employee)		
	1990	2000	2010	1990	2000	2010
Construction	154.0	156.0	177.0	37.1	40.3	44.1
Manufacturing	858.1	828.0	850.1	62.8	84.3	98.8
TCU	219.0	235.4	268.7	49.5	55.6	63.9
TOTAL	**1,231.1**	**1,219.4**	**1,295.8**	**149.4**	**180.2**	**206.8**
	TOTAL OUTPUT[a]					
	% Increase 1990-2000		**% Increase 2000-2010**		**% Increase 1990-2010**	
Construction	10%		24%		37%	
Manufacturing	30%		20%		56%	
TCU	21%		31%		58%	
TOTAL	**27%**		**22%**		**55%**	

Source: Southern California Association of Governments, 1994 RCPG.

Note: a) Total Output = Employment x Productivity.

reach the current permitted capacity of the SCVJSS in 1999. The figure also shows a range based on the lowest and highest per capita generation rates derived in Table 5-9. This illustrates that flow projections can vary significantly depending on the assumed per capita generation rate and the sensitivity of these numbers to water conservation practices. If wastewater flows develop more rapidly than flow projections indicate, the proposed facilities would be built sooner to match the growth. If, on the other hand, wastewater flows develop more slowly than flow projections indicate, the construction of proposed facilities would be delayed.

When planning incremental system expansions, treatment plants will be sized and service phased based on engineering and economic considerations. Any incremental expansion of the system could exceed projections in the interim but would be deemed conforming as long as the expansions are consistent with the 2015 population projections.

Future Flow Characteristics

Concentration of constituents in each plant's influent are expected to remain constant in spite of population increase unless the flow is altered intentionally through treatment plant operations, such as the selective diversion of flow from one WRP to the other. Deviations or fluctuations of TSS, Chemical Oxygen Demand (COD), or BOD concentrations could also result from water conservation, and/or changes in development patterns. The total mass of constituents, however, will increase due to the higher flow.

SCAG 96 POPULATION PROJECTION IMPACTS ON THE CONVEYANCE SYSTEM

The SCVJSS trunk sewers, which were described in Chapter 4, transport wastewater from local lines to and between the SWRP and VWRP. An analysis of these sewers was performed using computer software that analyzes information based on spatial relationships. This software, known as Geographical Information Systems (GIS), combined drainage boundaries (Figure 5-5) which were developed for SCVJSS trunk sewers with the SCAG 96 population projections that were discussed earlier in this chapter. A per capita generation rate of 101 gpcd was then applied in order to determine the impact of projected growth on the SCVJSS conveyance system. The results of the conveyance system analysis are summarized in Figure 5-6, which depicts the drainage boundaries as "snapshots" of the percentage of sewerage capacities available for the years 1994, 2000, 2010, and 2015.

BIOSOLIDS CHARACTERISTICS

Solids Production in the SCVJSS

There are two sources of solids requiring treatment in the SCVJSS. First, there are the wastewater solids generated in the service area of the SCVJSS and conveyed to the WRPs. These solids are mostly removed through grit screening and primary sedimentation and skimming. Second, excess biological solids are produced within the WRPs as part of the activated sludge process employed for secondary treatment. The mass of solids produced as a result of microbiological growth resulting from the uptake of mineral and organic matter within the aeration basins that must be removed from the system is termed waste activated sludge. Both the SWRP and VWRP employ an activated sludge process that produces waste activated sludge.

All solids processing takes place at the VWRP. Primary solids from the SWRP are returned to an interceptor where, along with diverted wastewater, they are conveyed to the VWRP and undergo conventional treatment. The waste activated sludge from the SWRP is conveyed via a force main to the VWRP where it is thickened by means of dissolved air flotation before entering the anaerobic digesters. At the VWRP, the primary solids removed are directly added to the digesters without thickening, while the waste activated sludge is thickened before digestion. After digestion, the solids are dewatered by plate and frame filter presses. The ultimate product, the digested and dewatered solids, is called biosolids. See Chapter 4 for a detailed description of existing solids treatment facilities.

The amount of solids produced is expected to increase in proportion to the increase in population within the SCVJSS service area. This assumption is valid as long as the existing land use patterns remain unchanged in new developments. Accordingly, the waste activated sludge generated at the WRPs will increase at approximately the same rate as wastewater flow treated at the plants. As long as development patterns remain relatively constant, concentrations of constituents in the solids are expected to remain constant as the population increases unless treatment plant unit operations are changed.

Solids Processing and Biosolids Characteristics

In addition to population growth, the projected quantities of biosolids for ultimate reuse or disposal are based on the level of performance achieved by various unit processes, including primary sedimentation, secondary treatment, thickening, anaerobic digestion, and mechanical dewatering. The VWRP solids processing system consists of thickening by dissolved air flotation (except primary solids), anaerobic digestion, and mechanical dewatering. The anaerobic digesters receive solids removed by settling from the primary sedimentation process at the VWRP and thickened waste activated sludge from the secondary treatment systems of the SWRP and VWRP. The anaerobic digestion process converts approximately 50 percent of the organic matter in the solids into gas consisting of methane and carbon dioxide. The methane is used as a fuel source for an on-site cogeneration unit, which supplies power for energy needs at the VWRP.

Following anaerobic digestion, the resulting slurry is still over 97 percent water. Plate and frame filter presses and coagulating chemicals are used to reduce the water content of the solids. The current dewatering system produces a material containing 25-30 percent solids by weight. After dewatering, the solids are in a more readily transportable and reusable form. In 1996, 4,180 dry tons of biosolids were produced at the VWRP. A summary of the metals in the biosolids as compared to the maximum limits is presented in Table 5-12.

Table 5-12
1996 BIOSOLIDS METALS AND LIMITS

CONSTITUENT	AVERAGE CONCENTRATION (mg/kg)	MAXIMUM LIMIT[a] (mg/kg)
Arsenic	5.0	41
Cadmium	2	39
Copper	740	1500
Lead	24	300
Mercury	2.0	17
Nickel	43	420
Selenium	4.0	100
Zinc	1100	2800

Note: a) According to 40 CFR 503.13, Table 3.