CITY of LIVERMORE

COMPREHENSIVE USER CHARGE STUDY
for
WASTEWATER COLLECTION, TREATMENT & DISPOSAL SERVICES

February 2008

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February 29, 2008

Mr. Dan McIntyre
Public Services Director
City of Livermore
1052 South Livermore Avenue
Livermore, California 94550

Subject: Comprehensive User Charge Study for Wastewater Collection, Treatment & Disposal Services

Dear Mr. McIntyre:

Pursuant to your request, and in accordance with the August 15, 2007 authorization of the City of Livermore (City) of my proposal of July 24, 2007, the comprehensive Wastewater User Charge Study for fiscal year 2008/09 has been completed after beginning work in October 2007. All comments on the January 30, 2008 review draft have been incorporated in the final report presented herein. This is the 8th comprehensive wastewater user charge study conducted by the City and completed by this Consultant; the last study was completed nearly two years ago on April 14, 2006.

The City may recall that the City's first comprehensive user charge study of April 1999 was not fully implemented by the City pending further review and study of implementation of a new billing system required to implement the proposed user charges. This was all accomplished by the City for fiscal year 2000/01 via full implementation of the April 2000 Study and a new nonresidential sewer user charge billing system. The City also amended its agreement with LLNL four years ago as recommended that is now generating more user charge revenue for the City. Lastly, an update of the City's long-term wastewater replacement financing study was completed by this Consultant on February 19, 2006. As a result, there are no changes proposed herein for user charge design, methods of assessing user charges to nonresidential customers, and funding for operating and replacement reserves. However, it is proposed that the City increase user charges by 9 percent which would be the first increase in four years and which is less than inflation since July 1, 2004.

Key Study Findings

- User charge revenues required for next fiscal year 2008/09 are estimated at $15.1 million, as compared to the April 2006 Study estimate two years ago of $15.8 million for fiscal year 2006/07 and a current fiscal year 2007/08 user charge revenue estimate of $16.8 million exclusive of capital improvements. A small deficit is estimated for the current fiscal year because the City has not increased user charge in four fiscal years. Proposed funding is allocable 78 percent for operations, 14 percent for

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replacement reserves and capital improvements, and 8 percent for debt service for LAVWMA's Series A Revenue Bonds.

- The City's Wastewater Replacement Financing Study was entirely updated by this Consultant with completion on February 19, 2006. There are nearly 800 assets with estimates of current replacement costs of $385 million, current annual depreciation of $5.9 million, and past depreciation of $141 million. Replacement reserves are currently $13 million as compared to only $1.8 million in the 2001 Study. Replacement funding requirements are annual depreciation of $5.9 million and past depreciation of $141 million both of which increase annually for inflation. This 2006 Study showed that CIPs and all future replacements can be funded from a Sewer Replacement Fund separately from the Sewer Operations Fund via continuation of Gradual Funding implementation. The sewer user charge replacement reserve accrual for next fiscal year 2008/09 is $2.43 million which is nearly 14 percent of projected user charge revenue requirements. An additional 1.4 percent of projected user charge revenue requirements is estimated to be required for the City's share of LAVWMA replacement reserve funding.
- The City's operating reserve balance has improved significantly in recent years. Minimum operating reserves for fiscal year 2008/09 are estimated at $6.7 million. It is estimated that the City will have $4.3 million in operating reserves by the end of the fiscal year, June 30, 2008 as well as the City's Budgetary Operating Reserves of $8.04 million. The City also has replacement reserves of $13.1 million as of June 30, 2007 that are clearly inadequate though far improved from none nine years ago. However, replacement reserves should not be used to meet operating cash flow requirements because then the funds may not be available for replacements and further are intended to earn interest income to contribute towards replacements. The City is continuing to budget to increase replacement reserves annually.
- This 2008 Study finds the need to increase user charges by 5 percent which is allocable to four fiscal years and far less than inflation despite the need to continue increasing replacement reserves due to past depreciation not yet funded. This 2008 Study is the fourth study to find the need for a minimal and less than inflation user charge increase after the first four studies proposed and the City so implemented a series of significant user charge increases.
- The single-family residential user charge is proposed to be increased by $2.00 from $37.70 to $39.70 monthly, as compared to the last two increases of $1.15 four years ago on July 1, 2004 and $1.00 the year before on July 1, 2003. These user charges are all exclusive of the lateral repair surcharge of $1.05 monthly with those repairs not typically done by the public agency but instead by the customer.
- Comprehensive user charge studies always find rate variances between the customer classes because use and cost characteristics are not constant but changing. All of the user charge unit costs of service increase and decrease by different amounts as a result of changes in customer wastewater characteristics and the composition of costs. As in prior studies for the City, the rate impact of the proposed user charges varies for the

customer classes because of changes in use and costs. However, the rate impact variances in recent studies have been minimal, in this study and the three prior studies, as compared to the four earlier studies. In the 2006 Study, there were again minor relative increases in BOD and SS unit costs due to higher cost increases for electricity, chemicals and sludge disposal compared to other cost increases that caused very slight user charge increases for users with high BOD and SS concentrations but which were not implemented. In this 2008 Study, the opposite occurs as electricity costs have stabilized in recent years. The single-family residential rate increase is proposed to be 5 percent or less than inflation when allocated over four fiscal years, and the average user charge increase is also proposed to be 5 percent. User charge revenues are estimated to increase by 5.7 percent due to the proposed increases in user charges and growth in system use.

- The City's new nonresidential sewer billing system implemented for fiscal year 2000/01 is recovering revenues as projected and the City's 1963 agreement with Lawrence Livermore Laboratory was modified four years ago per prior study recommendations because it was estimated that such modifications would generate additional revenues of $200,000 annually based on the proposed user charge system for fiscal year 2003/04.
- Most prior studies made good balances to the Water Reclamation Plant that clearly showed that all flow, biochemical oxygen demand (BOD), and suspended solids (SS) were being accounted for via identification of customer wastewater discharges. This 2008 Study finds significant increases in unaccountable BOD at 21 percent and unaccountable SS at 20 percent, as compared to 2006 Study findings of unaccountable BOD of 9 percent and unaccountable SS of 9 percent, 2004 Study findings of unaccountable BOD of 16 percent, 2003 Study findings of unaccountable BOD of 8 percent, and 2002 Study findings of unaccountable SS of 17 percent. However, these findings seem unlikely given the customer base of the City. These findings do, nonetheless, warrant investigation due to their magnitude though it is likely simply something to do with influent sampling or influent flow metering.
- Infiltration/inflow is unusually low, and the lowest seen over this Consultant's 31 years of studies, which is a very good finding given the City's limited export disposal capacity.

Current & Proposed User Charge Design

- Residential users are billed flat monthly rates according to dwelling type with the single-family residential allocation being 220 gallons per day (gpd). The City did lower the single-family residential allocation for connection fee design nearly two years from 220 gpd to 180 gpd, but this is due to expectations that new development with water conservation devices will use less capacity than existing City customers. Eventually, the user charge allocation may need to be lowered, too, but this is not yet being proposed.

- Commercial and institutional users are billed quantity rates based on metered water use adjusted for irrigation and wastewater strength characteristics by customer class.
- Industrial and demand users are billed according to actual wastewater discharged to the sewer system.
- User charges are based on identical user charge unit costs of service, subject to a minimum monthly user charge equal to the multiple-family monthly user charge.
- User charges include demand and loading unit costs of service with demand charges for treatment and disposal being proposed to commence upon purchase of a permit. Upon connection of the permit, the demand charge for collection commences as well as loading charges for collection, treatment and disposal.

It is proposed that the City increase its single-family residential user charge by $2.00 from $37.70 to $39.70 monthly exclusive of the lateral repair surcharge of $1.05 monthly, or by 5 percent as compared to recent increases of 3 percent four years ago, 3 percent five years ago, 12 percent six years ago, 3.5 percent seven years ago, 28 percent eight years ago, and 11 percent nine years ago. These user charge increases have been driven by the failed LAVWMA pipeline first with increasing replacement funding, then with new debt interest payments, and lastly new debt principal payments that began August 1, 2005, far higher electricity costs at LAVWMA and at the City's Water Reclamation Plant, higher costs for chemicals and sludge disposal for the City's WRP, the need for the City to begin accruing reserves for replacements with past depreciation estimated at $141 million, higher administrative costs implemented some years ago, and general inflation. After implementation of this proposed user charge increase for fiscal year 2008/09, it seems likely that future user charge increases will continue to be relatively less than the sum of recent user charge increases but will likely be greater than but closer to the general rate of inflation because of costs of electricity, chemicals, sludge disposal, and aging facilities requiring replacement likely to exceed the general rate of inflation. Gradual Funding implementation of the City's pay-as-you-go replacement financing plan alone requires annual funding increases that are five percent greater than inflation due to past depreciation of $141 million.

The average monthly user charge for 35 northern California communities was estimated to be $30.50 for fiscal year 2006/07, the latest survey available. The average for Alameda County was estimated to be $27.92, and the average for 753 California communities included in the survey was estimated to be $30.86. Current and proposed City residential rates are greater than the California average because of replacement financing being provided for on a pay-as-you-go basis and because of the extraordinary wastewater disposal costs of the Tri-Valley. LAVWMA costs are 15 percent of fiscal year 2008/09 funding, and City replacement reserve accruals instead of debt later are 15 percent of funding inclusive of LAVWMA replacement reserve accruals that are 1.4 percent of City funding. Though it is more common these days in California, two decades ago only four percent of wastewater utilities nationwide were accruing reserves for future replacements and few wastewater utilities have such significant disposal costs as in the Tri-Valley. Note that, like the City of Livermore, DSRSD, City of Pleasanton, LAVWMA and Zone 7 user charges all contain replacement reserve accruals.

City costs of wastewater services and components of the single-family residential user charge are shown below. Note that the single-family residential user charge allocations by funding type do not correlate to the proportions of funding type to total funding because of the cost-of-service allocations to customer discharges of flow, BOD and SS. Further note that LAVWMA debt estimated at $3.10 monthly for fiscal year 2008/09 assumes that there will be no further debt issued and none is currently anticipated. The LAVWMA Export Project has had lower construction costs and also lower debt interest expense than earlier planning estimates and hence Series B debt will not be needed.

Type of Service	Current User Charge, 2004/05-07/08	Current Allocation	Proposed User Charge	Proposed Allocation, 2008/09
Collection	$8.15	22 %	$6.80	17 %
Treatment	$22.70	60 %	$26.65	67 %
Disposal	$6.85	18 %	$6.25	16 %
Total user charge	$37.70	100 %	$39.70	100 %
Funding Type				
Operations	$24.85	66 %	$30.85	78 %
Replacement/CIP	$9.85	26 %	$5.75	14 %
LAVWMA Debt	$3.00	8 %	$3.10	8 %
Total user charge	$37.70	100 %	$39.70	100 %

Study Discussion

During the development of this study, City staff, Livermore-Amador Valley Water Management Agency staff (LAVWMA) staff, and State Water Resources Control Board (SWRCB) staff inputs have been solicited and received. The user charge study presented herein will satisfy federal and state regulations attendant to the existing grant-funded City and LAVWMA wastewater facilities and will, therefore, assist in qualifying each agency for any further federal and state grant assistance if such assistance were to become available. The user charge study is based on full cost-of-service philosophy with user charges proposed for wastewater services for fiscal year 2008/09.

The wastewater collection, treatment, and disposal systems are designed to serve the differing demands placed upon them by the various types of users connected to the system. To provide rate equity among users, it is necessary to allocate the costs of accommodating these demands to users in proportion to the wastewater characteristics of each. This is accomplished by determining unit costs of service for each treatment parameter and multiplying the resultant values by each user's wastewater characteristics to yield user charges based on the cost of providing wastewater service. Each customer is, therefore, assessed user charges according to the customer's contributions to peak and average wastewater flow and strength.

The proposed user charge system consists of a demand charge and a loading charge. Demand charges are based on peak month use and recover fixed costs associated with treatment plant capacity, such as debt service and personnel requirements. Loading charges are based on

annual use and recover variable costs such as power and chemicals, both of which vary according to actual wastewater treated. This demand/loading charge approach is very similar to water, electric, and gas rate structures. However, while these other utilities provide a single commodity of a uniform quality, a wastewater treatment system is designed to treat wastewater discharges of varying strength. Because treatment costs vary according to both the quantity and strength of wastewater discharged, it is necessary to base user charges on strength characteristics as well as the amount of discharge. Strength characteristics for the City's Water Reclamation Plant (WRP) are biochemical oxygen demand (BOD) and suspended solids (SS). Accordingly, demand and loading user charge unit costs of service are established for each treatment parameter of flow, BOD, and SS and the number of connections. These demand and loading user charge unit costs of service are used to calculate the proposed user charges that are shown below for fiscal year 2008/09:

Proposed User Charges For City Of Livermore For Fiscal Year 2008/09

User Class	Billing Units	Monthly User Charge, Dollars			
		Sewers	Treatment	Disposal	Total
Residential*					
Single-Family	DU	6.80	26.65	6.25	39.70
Condominiums	DU	4.60	18.70	4.35	27.60
Multiple-Family	DU	4.00	14.95	3.75	22.65
Commercial**					
Automobile Steam Cleaning	Ccf	0.88	7.34	0.78	9.00
Bakeries	Ccf	0.86	5.81	0.77	7.43
Commercial Laundries	Ccf	0.87	3.63	0.78	5.28
Markets With Disposals	Ccf	0.85	5.39	0.76	7.01
Mortuaries	Ccf	0.85	5.40	0.76	7.01
Restaurants	Ccf	0.86	5.66	0.77	7.29
All Other	Ccf	0.73	2.62	0.65	4.00
Institutional**					
Schools & Churches	Ccf	0.54	1.75	0.44	2.73
All Other	Ccf	0.49	1.74	0.44	2.67
Industrial					
Annual Loadings					
Volume	mg	1.05	339.80	216.94	557.79
BOD	M lb	0.00	144.67	0.00	144.67
SS	M lb	0.00	117.59	0.00	117.59
Peak Month Loadings					
Flow	mgd	30,780.95	62,560.04	21,910.98	115,251.97
BOD	lb/day	0.00	7.57	0.00	7.57
SS	lb/day	0.00	4.14	0.00	4.14
Connection	each	0.00	1.66	0.00	1.66

*Single-family surcharge for the City's lateral program is not included above.
**Commercial & institutional user charges are adjusted for irrigation by user class.

User charges are also proposed in this study to recover costs of the City's Source Control Program. The Source Control Program is required by SWRCB and USEPA regulations and currently serves eighty-five customers. The program is to better identify certain customer wastewater discharges and to control discharges of contaminants from commercial and industrial sources. If not identified and controlled, such discharges will lead to a loss of revenue and can cause operational and/or performance problems at the treatment plant both of which would result in higher user charges for all City wastewater customers.

Like the general user charge system applicable to all City wastewater customers, the Source Control Program user charge system consists of a demand charge and a loading charge. The demand charge consists of a flat, monthly service charge that is designed to recover administrative costs that are fixed as a function of the number of routine samples to be conducted annually. The loading charge is a charge designed to recover costs of wastewater sampling. The sampling charge varies for each billing period according to the number and type of sampling analyses conducted during the billing period. Proposed user charges for the Source Control Program are 5 percent greater than the City's current user charges but this 5 percent increase is allocable over four fiscal years. Some of the proposed Source Control Program user charges for fiscal year 2008/09 are:

- Monthly services charges are $678.95 for weekly sampling, $169.75 for monthly sampling, $56.60 for quarterly sampling, and $14.15 for annual sampling.
- Sampling charges are $436.25 for a composite sample, $174.50 for a grab sample, and twice these amounts for violation follow-up sampling. These charges include general analyses for BOD, COD, SS, pH, grease and oil done by the City's laboratory. Costs of special analyses by commercial laboratory are an additional charge at cost plus an administrative charge of fifteen percent.
- Note that proposed service charges and sampling charges for the City's Source Control Program are far less than those assessed in the western valley.
- There are a number of proposed charges for special tasks such as permit processing, inspections, permit amendments, and hearings for violations.

I appreciate this opportunity to again be of service to the City of Livermore and I am available to discuss my findings with you and other interested parties at your convenience. I also wish to acknowledge the assistance and cooperation of City staff in developing the study presented herein, and especially that provided by Mr. Darren Greenwood and staff at the Water Reclamation Plant and the assistance provided by staff of the City's Finance Department.

Very truly yours,

Craig R. Lawson

Craig R. Lawson

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INTRODUCTION AND REPORT SUMMARY

This report documents the results of a study of funding the operations of the water reclamation facilities the City of Livermore (City). This study was undertaken to determine the annual revenues necessary to fund the operation of City wastewater collection, source control, treatment, and disposal facilities and programs and to develop user charges to derive these annual revenue requirements from system customers commensurate with the cost of providing various wastewater services.

Previous Rate Studies

This is the 8th comprehensive wastewater user charge study completed by this Consultant for the City; previous studies were completed in April 2006, April 2004, March 2003, March 2002, April 2001, April 2000 and April 1999. The first study of April 1999 was not entirely implemented pending further review by City staff and preparations for the implementation of a new billing system required to properly administer and implement that study. This was completed via implementation of the April 2000 Study in its entirety for fiscal year 2000/01.

Other Studies

The results of two other related studies are incorporated in the study presented herein. The first study is the City's first Long-Term Replacement Financing Study for Sanitary Sewer and Water Reclamation Plant Facilities completed by this Consultant on February 19, 2006. The second study is the "Revenue Program for Fiscal Years 2006/07 and 2007/08" dated June 2006 for the Livermore-Amador Valley Water Management Agency (LAVWMA) along with annual use and cost reconciliations done after each audit. The LAVWMA study was undertaken to determine the annual revenues necessary to finance both debt service requirements, replacement reserve accruals, and operation and maintenance of the LAVWMA wastewater export system and to develop user charges to derive these revenue requirements from the DSDRD, City of Pleasanton, and City of Livermore commensurate with the cost of providing wastewater disposal service for each of the three member agencies.

State and Federal Mandates Pertaining to Rates

Because the City and LAVWMA used federal and state grants to finance a portion of the costs of the existing wastewater facilities, there are certain restrictions on the types and purposes of charges that can be included in the and City's wastewater rate structures over the useful life of the grant-funded facilities. Federal and state regulations attendant to the City's existing grant and loan funded facilities are summarized below:

1. **User Charges.** Costs of operation and maintenance including replacements must be recovered via user charges that are proportional to the cost of service provided recipients of wastewater service.

2. **Regional Projects.** All costs of regional projects serving more than one agency must be distributed among the agencies or users of such agencies in proportion to use.

3. **Changes in User Charges.** User charges shall be revised as necessary to reflect actual funding needs of the treatment plant. Any time user charges are changed, a copy of the work papers or study and the implementing ordinance or resolution shall be forwarded to the California Revenue Specialist for review and approval, and this is also applicable to joint-powers agreements for regional projects.

4. **Full Disclosure.** If capital-related costs of wastewater service are not recovered in proportion to system use, a statement describing the rate impact of such action must be included in the revenue program. Such information must also be made public at a public hearing and in all notices required by the public hearing notification procedure prescribed by laws governing the grantee.

5. **Replacement Funding.** User charges must recover replacement costs that include all capital expenditures except for major rehabilitations, structural rehabilitations, and expansions and upgrades required to meet future user demands. Replacement costs should be based on either a 5-year replacement plan or straight-line depreciation at current replacement costs.

Need for Study

The City's current user charges are based on an April 2004 Study, and the City elected to not implement at 2 percent user charge increase proposed in the last study of April 2006 Study. The reasons for updating these analyses and conducting the study presented herein are itemized below:

1. The current wastewater user charge system of the City was designed to recover adequate revenue requirements projected through June 30, 2005. User charges need to be increased due to increasing costs particularly for greater power costs for the City and LAVWMA, greater chemical costs for the City, general inflation, LAVWMA Series A debt service principal payments that began August 2005, and because operating and replacement reserves are inadequate.

2. This is the fifth study that contains an entire year of nonresidential data from the Cal Water service area for estimating winter-time sewer flows, and the sewer to water use ratios for nonresidential customers continue to be refined after originally basing them on older studies for the western Tri-Valley.

3. The City implemented the April 2000 Study in its entirety together with a new billing system necessary to properly administer that study. It is essential that the City is recovering user charge revenues as estimated both for the City to pay bills and for the City to comply with the bond covenants for the March 2001 LAVWMA Series A bond issue for $142 million.

4. If user charges are not adjusted regularly, more significant adjustments will be required later because operating and capital reserves used to offset any revenue

deficiencies would have to be recovered in addition to cost increases attributable to inflation and any extraordinary changes in operation and maintenance requirements.

5. This is the 8th comprehensive cost-of-service user charge study conducted by the City. Because some costs have escalated at significantly different rates than others, and the composition of wastewater customers has changed (particularly with the drought ending seven years ago and growth resuming) the cost-of-service basis has also changed. As a result of these changes, the ratemaking criteria of rate equity and revenue adequacy are not likely to being achieved without regular study updates. Because the cost of service basis has changed, it is improper to merely increase user charges by the percent of the revenue shortfall; the resulting user charges would be inequitable.

6. There have been and will be further changes in customer wastewater characteristics which must be incorporated in the user charge system in order to achieve rate equity and revenue adequacy.

7. Section 40 CFR 35.929-2 (b) of the United States Environmental Protection Agency (USEPA) regulations mandate that a grantee review its user charge system biennially and, if necessary, adjust its system of rates and charges to ensure revenue adequacy and rate equity. The March 1998 SWRCB Revenue Program Guidelines for Wastewater Agencies require grantees to conduct such reviews if there have been changes in use and costs which affect the cost of service basis.

Study Objectives

Craig R. Lawson, Utility Management Consultant, was authorized by the City of Livermore to develop a user charge system for City water reclamation and sanitary sewer facilities which would accomplish the following:

- Analyze City customer wastewater characteristics and project these customer wastewater characteristics over the defined study period.
- Document the amount needed for operation and maintenance of the wastewater collection, industrial waste, treatment and disposal facilities and programs and project revenue requirements over the defined study period, fiscal year 2008/09, based on current costs escalated to account for anticipated inflation, growth in system use, extraordinary changes in operation and maintenance, and any proposed debt and capital improvements.
- Derive these projected revenue requirements from each customer classification in a manner proportional with the cost of providing wastewater services, including: wastewater collection, treatment, disposal, source control, billing and administration services.
- Design a computer model of the user charge system that is designed to efficiently conduct sensitivity analyses of the critical variables that affect the level and allocation of user charges and future updates of the study.

- Satisfy United States Environmental Protection Agency (USEPA) and California State Water Resources Control Board (SWRCB) regulations that are applicable to the existing grant and loan funded City and LAVWMA wastewater management facilities and conform to current, standard ratemaking practices.
- Is efficient to both implement and administer and is understandable and supportable to the customer.

Scope of Services

In order to accomplish the study objectives, Craig R. Lawson, Utility Management Consultant, performed the following tasks:

- Determined current peak month and annual discharges of flow, Biochemical Oxygen Demand (BOD) and Suspended Solids (SS).
- Determined the number of connections and the billing units for each customer class and large individual user.
- Projected customer wastewater characteristics for the defined study period, fiscal year 2008/09.
- Analyzed historical City wastewater revenue requirements and projected wastewater system costs through June 30, 2009, giving due consideration to the cost-influencing factors of inflation, anticipated changes in system use, and extraordinary changes in operation and maintenance.
- Conducted a detailed cost-of-service analysis to determine the cost of providing various wastewater services to the different types of users tributary to the system.
- Developed user charge systems for wastewater system operations and replacements and source control program services based on cost-of-service analyses that are designed to recover wastewater system costs in a fair and equitable manner for the defined study period.
- Incorporated higher LAVWMA costs along with anticipated higher LAVWMA replacement reserve accruals due to the completion of the Export Facilities Project.
- Documented the results of the study in this report that is designed for intense public scrutiny.

Summary of Findings

A full discussion of the study findings is presented in Chapters 2-6. The significant findings pertaining to the wastewater user charge study are summarized below:

Customer Wastewater Characteristics (Chapter 2)

1. Water Reclamation Plant flows for fiscal year 2006/07 averaged 7.213 million gallons per day (mgd) with average Biochemical Oxygen Demand and Suspended

Solids concentrations of 343 milligrams per liter (mg/l) and 323 mg/l, respectively. Historical average annual and peak month flows and loadings are summarized in Tables 1-1 and 1-2:

Table 1-1

Year	Annual Average Influent Flows & Loadings		
	Annual flow, mgd	BOD, mg/l	SS, mg/l
2006/07	7.2	343	323
2005	7.2	270	256
2003	6.6	301	260
2002	6.4	296	260
2001	6.2	254	294
2000	6.2	253	232
1999	6.2	218	206
1998	6.5	243	227

Table 1-2

Year	Peak Influent Flows & Loadings		
	Peak flow, mgd	BOD, ppd	SS, ppd
2006/07	7.495	25,480	29,120
2005	7.774	19,330	17,670
2003	7.068	21,310	18,770
2002	7.053	18,000	16,920
2001	6.574	17,750	17,860
2000	6.846	17,170	14,730
1999	6.492	13,640	13,800
1998	8.014	13,370	12,960

2. Residential flows are estimated with a balance to the Water Reclamation Plant to be 66.83 gallon per capita per day for an average of 188 gpd per dwelling unit which are shown in Table 1-3 below with historical estimates:

Table 1-3

Year	Plant Flows per Capita, gpd	Plant Flows per Dwelling, gpd	Winter Water Use Per Single-family Dwelling, gpd
2006/07	66.83	188	223
2005	70.12	198	209
2003	62.67	177	204
2002	64.43	182	233
2001	65.89	184	246
2000	69.64	189	210
1999	68.37	187	217
1998	59.0	161	232

Residential winter water use data has not yet been available from the Cal Water service area for comparison purposes. Residential winter water use estimates for the City's water service area are shown above. Differences in the measured winter water use and plant flows can be caused by inaccuracy in flow measurements, the inclusion of some irrigation usage even in winter, and infiltration or exfiltration in the sewer collection system.

3. The City's WRP balance is considered to be good, and clearly indicates that historical flows of 280 gpd per dwelling unit used for rate design prior to implementation of the April 1999 Study was far too high. All connection fees in the Tri-Valley were based on a flow allocation of 220 gpd per dwelling unit equivalent, as compared to the historical allocation of 280 gpd, until the City lowered the allocation to 180 gpd in November 2004.

   In 1999, the western Tri-Valley implemented new residential flow allocations for user charge design of 220 gpd for single-family, 155 gpd for condominiums and 133 gpd for multiple-family units. The averages for 1997 through 2003 for condominiums and multiple-family units for the western valley were 144 gpd and 123 gpd, respectively, but these new estimates were not implemented, and the current rate-design in the western Tri-Valley uses 150 gpd and 126 gpd, respectively. These estimates have been used for City rate design because this data is not yet readily available for the City's service area; current design for the City is 150 gpd and 130 gpd, respectively, and projected design for the City is also 150 gpd and 130 gpd, respectively. Single-family user charge design is still 220 gpd.

4. Though the City just changed its dwelling unit equivalent allocation from 220 gpd to 180 gpd, user charge design for single-family residential customers remains at 220 gpd, given the results of annual studies for the western Tri-Valley since 1977 and the City's eight rate-studies, until such time that it is clear that use is greater or less. There is no Livermore data currently available to justify changing the City's past practice of assessing other residential customers at seventy-five percent of the

single-family rate. Accordingly, after considerable study, estimates for the western valley were used for Livermore beginning with the April 1999 Study.

5. The balance of flows not assigned to the customer use classes are allocated to infiltration/inflow. Based on residential use of 66.83 gpcd, peak month I/I and annual I/I are estimated to be negatives of 0.05-mgd and a 0.017-mg, respectively, or not even remotely close to estimates for the western valley. These estimates together with historical estimates are shown in Table 1-4:

Table 1-4

Year	Residential flows, gpcd	Peak month I/I, mgd	Annual I/I, mgd
2006/07	66.8	(0.05)	(0.017)
2005	70.1	0.39	82.6
2003	62.7	0.36	2.80
2002	64.4	0.60	(0.03)
2001	65.9	0.24	(0.06)
2000	69.6	0.30	0.03
1999	68.4	0.29	0.16
1998	59.0	0.72	0.86

If residential winter water use is used along with the sanitary flow estimate of 220 gpd per single-family dwelling, estimates of Infiltration/Inflow have turned negative in prior City's studies, 0.11-mgd and 113-mg, respectively, in the 2004 Study and 2006 Study. It seems highly unlikely that the City has that much exfiltration, though it appears there may be some. This apparent exfiltration might also be explained by meter inaccuracies or by the presence of some irrigation usage during the winter months. Projections in the 2004 Study assumed no I/I instead of exfiltration. In the 2006 Study, I/I estimates were lowered to 0.3130 mgd for the peak month and to 32.22 mg annually in order for the sum of all customer flows to be equal to those at the City's Water Reclamation Plant. In this 2008 Study, I/I is assumed to be zero.

6. Based on a balance of BOD and SS loadings, domestic-strength BOD and SS concentrations are estimated to be 324 mg/l and 312 mg/l, respectively, and are summarized in Table 1-5 together with historical estimates:

Table 1-5. Average Residential Wastewater Strength

Year	Study Year	BOD, mg/l	SS, mg/l
2006/07	2008	324	312
2005	2006	265	257
2003	2004	270	234
2002	2003	251	228
2001	2002	215	264
2000	2001	233	220
1999	2000	216	224
1998	1999	215	230
Average		249	246

7. Most of these estimates for the City are good estimates and there were likely no unaccountable BOD and SS being discharged by an unidentified customer(s). However, the domestic-strength estimates of BOD and SS concentrations were on the high side in the 2006 Study and now are way too high in this 2008 Study. Study projections are based on averages for these seven studies and this 2008 Study of 249 mg/l for BOD and 246 mg/l for SS and both are considered normal for domestic-strength sewer concentrations though somewhat high. Use of these averages does result in unaccountable BOD and SS but these estimates are not carried forward to study projections. However, estimated unaccountable BOD of 1,619.82 million lb and unaccountable SS of 1,398.42 million lb warrant investigation because these are very large amounts.

8. The nonresidential sewer to water use ratios are mostly reasonable. Some of the nonresidential sewer to water use ratios found in this study and in past studies were clearly too high, and some were clearly too low, though for the nonresidential classes as a whole the ratios were as expected. Good ratios are required to achieve rate equity between the customer classes, and ratios do change over time due to weather, pricing of water and sewer, and increasing numbers of irrigation only meters which decrease the percentage of irrigation usage inadvertently included in the calculations. Minimal changes were made to the ratios used previously so as to cause only minimal changes in user charge design until another year's data is analyzed. Historical and projected sewer to water use ratios are shown in Table 1-6 on the following page:

Table 1-6

Sewer To Water Use Ratios for Commercial & Institutional Customer Classes

Customer Class	New Design	Old Design	Avg 05 & 07	Avg 01 - 07	Calendar Year				
					2006/07	2005	2003	2002	2001
Commercial									
Auto Steam	99%	98%	99%	84%	99%	100%	29%	72%	120%
Bakeries	97%	97%	96%	93%	95%	97%	86%	88%	99%
C. Laundries	98%	98%	102%	99%	97%	106%	93%	100%	97%
Markets	96%	96%	98%	96%	101%	94%	96%	87%	101%
Mortuaries	96%	96%	48%	44%	58%	38%	28%	63%	31%
Restaurants	97%	97%	97%	94%	94%	101%	91%	86%	97%
All Other	82%	83%	89%	82%	80%	97%	76%	77%	78%
All Commercial	84%	85%	90%	84%	83%	97%	78%	79%	81%
Institutional									
Schools	35%	36%	31%	36%	35%	26%	45%	33%	40%
All Other	55%	55%	148%	102%	181%	114%	89%	66%	60%
All Institutional	36%	37%	37%	39%	44%	30%	47%	34%	40%

9. The user classes and their proportion of peak month and annual flows and loadings are shown below:

Table 1-7

Projected Customer Wastewater Use Characteristics

Customer Class	Number Meters	Annual Loadings			Peak Month Loadings		
		Flow,	BOD,	SS,	Flow,	BOD,	SS,
Residential	96%	80%	76%	78%	76%	72%	74%
Commercial	3%	14%	20%	18%	16%	22%	20%
Institutional	0.31%	2%	2%	2%	4%	4%	4%
Industrial	0.01%	4%	2%	2%	4%	2%	2%
Infiltration/Inflow		0%	0%	0%	0%	0%	0%
Unaccountable		0%	0%	0%	0%	0%	0%
Total	100%	100%	100%	100%	100%	100%	100%

10. The City's Water Reclamation Plant (WRP) is designed for an average dry weather flow of 8.5 mgd. After deducting the average dry-weather flow of 7.21 mgd, 1.29 mgd will remain available for future use that is 15 percent of design capacity.

User Charge Revenue Requirements (Chapter 3)

Operating Reserves

11. Operating reserves are required to meet cash flow requirements and to provide for contingencies. Cash flow requirements result from having to fund expenses before

the associated revenue is received. In the case of the City's Water Reclamation Plant Enterprise Fund, City residential customers are assessed user charges via property tax rolls and nonresidential customers are billed monthly based on water consumption. Accordingly, the City begins fiscal year expenses on July 1 but does not receive most of its revenue until late December. In order to meet cash flow requirements, the City should hold as operating reserves one-half year of operating expenses inclusive of LAVWMA charges but exclusive of replacement reserve accruals allocable to residential customers and 1/12 of these same costs allocable to nonresidential customers billed monthly. Furthermore, five percent of operating expenses should be held in operating reserves for contingencies.

Minimum operating reserves for fiscal year 2007/08 are estimated at $4.55 million, or about 41.5% of the operating budged based on the Livermore City Council policy of ramping up to a 50% operating reserve level by 2010. It is estimated that the City will have approximately $4.8 million in operating reserves by the end of the fiscal year, June 30, 2008. The City also has replacement reserves of $13.1 million as of June 30, 2007 that are also clearly inadequate though far improved from none nine years ago. However, replacement reserves should not be used to meet operating cash flow requirements because then the funds may not be available for replacements and further are intended to earn interest income to contribute towards replacements. Accordingly, the City is continuing to budget to increase replacement reserves annually until the 50% target is reached.

12. To ramp up to the target operating reserve levels, the City budgeted $5,000 for fiscal year 1997/98, $100,000 for fiscal year 1998/99, $200,000 for 1999/2000, $739,000 for fiscal year 2000/01, $600,000 for fiscal year 2001/02, a deficit of $120,000 for fiscal year 2002/03, $750,000 for fiscal year 2003/04, $600,000 for both fiscal years 2004/05 and 2005/06, $874,000 for fiscal year 2006/07, and $530,000 for current fiscal year 2007/08 to increase operating reserves.

    In prior studies, it was advised that the City had $4.0 million of surplus LAVWMA funds if the City did not participate in the LAVWMA expansion. These funds were to get the City over the estimated optimal reserve level but with the City's participation in the LAVWMA expansion through passage of Measure E in 2005, this LAVWMA surplus will be less and the reconciliation of that and the Export Facilities Project costs has not yet been done. Accordingly, City will need to continue to rely upon replacement reserves to meet cash flow requirements in the near term.

Replacement Reserves

13. The City's first long-term replacement financing study was completed by this Consultant in September 2001. The Proposed Gradual Funding alternative was incorporated in fiscal year 2002/03 user charges and in the fiscal year 2003/04 user charge system, though capital improvements offset a good portion of these accruals. Fiscal year 2004/05 user charge design that was also now applicable to fiscal year 2005/06 contained the September 2001 Study accrual for that year of $1.3 million which was than less budgeted capital improvements (CIPs), or $1.3 million and $5.0 million, respectively.

14. The City's wastewater replacement financing study was entirely updated by this Consultant with completion on February 19, 2006. There are nearly 800 assets with estimates of current replacement costs of $385 million, current annual depreciation of $5.9 million, and past depreciation of $141 million. Replacement reserves are currently $13.1 million as compared to only $1.8 million at the time of the 2001 Study. Replacement funding requirements are annual depreciation of $5.9 million and past depreciation of $141 million, both of which increase annually for inflation. The 2006 Study shows that CIPs and all future replacements can be funded from a Sewer Replacement Fund separately from the Sewer Operations Fund via continuation of Gradual Funding implementation. Replacement reserves for current fiscal year 2007/08 are budgeted at $2.24 million, and are projected to be $2.43 million for next fiscal year 2008/09; both are from the 2006 Replacement Financing Study.

Livermore Amador Valley Water Management Agency (LAVWMA)

15. LAVWMA fixed and variable costs were projected to increase for inflation and growth. Debt service costs are now based on actual March 2001 Series A debt service payments. It was recommended in previous studies, and the City so implemented, that user charges of member agencies need to be increased before, and not after, new LAVWMA debt is issued. Based on LAVWMA planning, debt service allocations to the City were estimated to increase from $183,897 for fiscal year 1999/00 to $1,604,857 for fiscal year 2000/01. Further increases were to occur annually until fiscal year 2005/06 when debt was estimated for the City at $2.7 million.

    Since the April 2000 Study, the construction bids approved by LAVWMA were less than planning estimates and the Series A debt service payments were significantly less than planning estimates because of an interest rate of 4.98 percent as compared to 6.5 percent used for planning. This occurred because of declining interest rates in general. Actual Series A debt service payments for the City for LAVWMA were $974,567 and increased to $1,330,032 for fiscal year 2005/06 with principal payments that began on August 1, 2005. These debt payments are significantly less than planning estimates but there has since been other annual cost increases.

Historical Revenue Requirements

16. Historical and projected user charge revenue requirements are summarized in Table 1-8 below. Note that some of bumps are due to costs of capital improvements with none contained in fiscal year 2007/2008 or 2008/09 beyond the replacement reserve accrual amounts.

Table 1-8

Fiscal Year	User Charge Revenue Requirements, Millions
2008/09	$17.9
2007/08	$16.2*
2006/07	$16.0
2005/06	$18.6
2004/05	$14.4
2003/04	$13.3
2002/03	$10.7
2001/02	$10.4
2000/01	$12.0
1999/00	$8.2
1998/99	$7.1
1997/98	$6.2

*Fiscal Year 2007/2008 includes a $2.3 million transfer from Replacement Reserves for capital projects.

17. The study of March 2002 found the need for an 11 percent user charge increase for fiscal year 2002/03 that was allocable 6 percent to a new administrative surcharge per a DMG Study, 2 percent to higher customer accounting costs, 1 percent to the need to amend the sewer service contract with LLNL with that contained in operating reserves, 1 percent for increasing operating reserves, and 1 percent for other cost increases. The 2003 Study found costs having stabilized and a user charge increase of only 2.1 percent was proposed and implemented. A 2.8 percent inflationary user charge increase was proposed and implemented for fiscal year 2004/05 in the April 2004 Study. A 2 percent user charge increase was proposed in the April 2006 Study for fiscal year 2006/07, which was only 2.5 percent annually over two years since the City last increased user charges. However, the City elected to not change user charges and hence the current user charges have been effective for four fiscal years. As a result, a larger user charge increase is now needed in this 2008 Study in the amount of 5.4 percent, but this is well below inflation over these four fiscal years. The Consumer Price Index for the San Francisco Bay Area increased by about 9.9% over this period. User charge systems are developed in subsequent chapters in order to recover these revenue requirements from wastewater customers according to the cost of providing various wastewater services to each type of customer tributary to the wastewater management facilities. Historical and projected user charge revenue requirements

are summarized below first by type of sewer service and then by major cost category:

Table 1-9

Percent of User Charge Revenue Requirements

Sewer Service	97/98	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09
Sanitary Sewer System	6%	5%	10%	7%	11%	14%	18%	15%	29%	17%	30%	18%
Source Control	3%	1%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Administration	20%	22%	19%	20%	22%	20%	17%	17%	13%	17%	16%	20%
Customer Accounting	1%	1%	2%	2%	1%	2%	2%	2%	2%	2%	2%	2%
Laboratory	5%	5%	4%	3%	3%	3%	3%	3%	2%	3%	3%	3%
Water Reclamation Plant	42%	45%	34%	44%	39%	36%	41%	44%	39%	43%	36%	39%
LAVWMA	22%	20%	28%	23%	22%	22%	17%	17%	13%	16%	12%	15%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Percent of User Charge Revenue Requirements

Major Cost Category	97/98	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09
Personnel	40%	32%	29%	26%	28%	31%	32%	34%	27%	32%	26%	33%
Chemicals	8%	5%	4%	3%	3%	4%	2%	3%	2%	3%	3%	4%
Power	12%	13%	9%	8%	13%	11%	9%	8%	6%	7%	6%	8%
Sludge Disposal	4%	3%	2%	2%	2%	2%	2%	2%	1%	1%	1%	2%
Services & Supplies	15%	23%	25%	12%	14%	14%	12%	13%	10%	13%	12%	15%
Repairs & Maintenance	4%	6%	6%	3%	5%	4%	3%	4%	4%	3%	2%	3%
Administrative Charges	5%	5%	4%	10%	11%	11%	9%	10%	8%	10%	7%	9%
Debt Service	4%	3%	10%	12%	11%	10%	8%	8%	8%	9%	7%	8%
Capital & Replacements	8%	11%	11%	25%	13%	15%	22%	20%	36%	22%	36%	19%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Cost of Service Analysis (Chapter 4)

18. Current cost allocation percentages for the treatment parameters used for the City's Water Reclamation Plant are summarized below:

Table 1-10

Treatment parameter	Allocation, percent
Flow	66.7
BOD	21.8
SS	11.5

19. The treatment parameter cost allocation percentages used for user charge design are summarized below:

Table 1-11

Treatment parameter	2001 Study, percent	2002 Study, percent	2003 Study, percent	2004 Study, percent	2006 Study, percent	2008Study, percent
Peak Month						
Flow	61.0	60.2	58.6	64.4	62.6	63.4
BOD	10.9	9.2	9.3	9.5	9.0	9.2
SS	5.7	4.8	4.9	5.0	4.8	4.8
Connection	0.2	3.2	3.2	2.0	3.3	3.1
Source Control	1.3	1.6	1.8	1.9	1.7	1.4
Total Fixed Costs	79.1	79	77.8	82.8	81.4	82%
Annual Loadings						
Volume	8.0	9.1	10.6	8.1	9.2	9.0
BOD	7.5	6.8	6.7	5.2	5.3	5.1
SS	5.4	5.0	4.9	3.9	4.1	4.0
Total Variable Costs	20.9	21	22.2	17.2	18.6	18%
Total	100.0	100.0	100.0	100.0	100.0	100.0

As shown, 82 percent of costs are fixed as a function of the facilities constructed. The balance of costs of 18 percent is variable costs proportional to actual use and increases and decreases as customer use changes. This is a shift of 1 percent to fixed costs as compared a 2 percent shift to variable costs two years ago. This is because costs of electricity, chemicals and sludge hauling have stabilized after having been increasing more than other costs.

User Charge System (Chapter 5)

20. It is recommended that residential users continue to be billed flat monthly rates according to dwelling type and that commercial and institutional users now be billed quantity rates. It is further recommended that industrial and demand users be billed according to actual wastewater discharged to the sewer system. Note that all user charges are based on identical user charge unit costs of service. Also note that all users are subject to a minimum monthly user charge equal to the multiple-family monthly user charge.

21. This 2008 Study finds the need to increase overall user charges by 5.4 percent which is allocable to four fiscal years and is less than inflation despite the need to continue increasing replacement reserves due to past depreciation not yet funded and to continue increasing operating reserves to ramp up to the City Council target of 50% of operating costs.

22. The average monthly user charge for 35 northern California communities was estimated to be $30.50 for fiscal year 2006/07, the latest survey available. The average for Alameda County was estimated to be $27.92, and the average for 753 California communities included in the survey was estimated to be $30.86. The proposed Livermore monthly user charge would be $39.70 per month. Current and proposed City residential rates are greater than the California average because of replacement financing being provided for on a pay-as-you-go basis and because of the extraordinary wastewater disposal costs of the Tri-Valley. LAVWMA costs are 15 percent of fiscal year 2008/09 funding, and City replacement reserve accruals instead of debt later are 15 percent of funding inclusive of LAVWMA replacement reserve accruals that are 1.4 percent of City funding. Though it is more common these days in California, two decades ago only four percent of wastewater utilities nationwide were accruing reserves for future replacements and few wastewater utilities have such significant disposal costs as in the Tri-Valley. Note that, like the City of Livermore, DSRSD, City of Pleasanton, LAVWMA and Zone 7 user charges all contain replacement reserve accruals.

23. The proposed user charges will recover adequate revenues through June 30, 2009. However, it is projected that operating reserves will still be far less than the optimal level. Furthermore, replacement reserves will be minimal in view of past, unfunded depreciation and the fact that a single, major failure could easily deplete all reserves.

24. City costs of wastewater services and components of the single-family residential user charge are shown below:

Table 1-12

Type of Service	Current User Charge, 2004/05-07/08	Current Allocation	Proposed User Charge	Proposed Allocation, 2008/09
Collection	$8.15	22 %	$6.80	17 %
Treatment	$22.70	60 %	$26.65	67 %
Disposal	$6.85	18 %	$6.25	16 %
Total user charge	$37.70	100 %	$39.70	100 %
Funding Type				
Operations	$24.85	66 %	$30.85	78 %
Replacement/CIP	$9.85	26 %	$5.75	14 %
LAVWMA Debt	$3.00	8 %	$3.10	8 %
Total user charge	$37.70	100 %	$39.70	100 %

25. Note that the single-family residential user charge allocations by funding type do not correlate to the proportions of funding type to total funding because of the cost-of-service allocations to customer discharges of flow, BOD and SS. Further note that LAVWMA debt estimated at $3.15 monthly for fiscal year 2002/03 assumed that Series B debt would be issued. However, the LAVWMA Export Project to date has had lower construction costs and also lower debt interest expense than earlier planning estimates and hence Series B debt was not needed. Accordingly, the user charge now required for LAVWMA debt is $3.10 for fiscal

year 2008/09 after having increased August 1, 2005 when principal payments began in addition to interest payments biannually. Because annual debt service payments are now fixed, growth causes the user charge to decrease over time.

Source Control Program User Charge System (Chapter 6)

26. The costs of the Source Control Program are recovered via user charges assessed to City customers that are included in the program. The City's current user charge system is based on the April 2004 Study and consists of permit fees, inspection and document reviews at an hourly rate, a fee for composite sampling with general analyses, a fee for grab sampling with general analyses, and fees for special analyses by commercial laboratory at cost plus fifteen percent.

27. No changes are proposed for the City's Source Control use charge system except for the similar increase as proposed for the general user charge system. It is proposed that Source Control Program customers continue to be assessed flat monthly service charges in addition to charges for sampling and analyses. These monthly service charges are for users sampled four times monthly, once monthly, quarterly, and annually. Variable charges for wastewater sampling analyses are proposed to continue to include a charge for a composite sample with general analyses and a charge for a grab sample with general analyses. Charges for special analyses are at cost plus an administrative charge of fifteen percent. Variable charges to users vary according to the number and type of analyses conducted during the billing period. Furthermore, there are charges proposed herein for permitting, inspections and enforcement hearings.

28. Seventy-five wastewater customers are currently included in the Source Control Program, as compared to eighty-five wastewater customers two years ago, and various types of wastewater analyses are conducted.

29. Source Control resources were allocated fifty-five percent to the WRP based on resources estimated for investigation activities, and five percent laboratory resources were allocated to the Source Control Program. There were also composite allocations for administrative expense, operating reserves and miscellaneous income. Source Control Program user charge revenue requirements for fiscal year 2008/09 are estimated to be $245,000.

30. Cost allocations result in twenty-three percent of Source Control Program costs being allocated to administration and the balance of seventy-seventy percent being allocated to sampling and laboratory analyses. Eighty-five percent of the costs are fixed as a function of the program. The balance of fifteen percent of costs is variable and is a function of the number and type of analyses performed.

31. The impact of proposed source control user charges is 5 percent that is allocable to four fiscal years or less than inflation, and the current and proposed source control user charges are far less than those assessed in the western valley. For example, the proposed weekly sampling service charge of $678.95 monthly for by Livermore is well less than the $1,067.50 assessed by Pleasanton and DSRSD. The composite sampling charge of $436.25 proposed for Livermore is less than

$515.00 assessed in the western valley. Accordingly, source control user charges proposed for Livermore are reasonable.

Recommendations

The recommendations, presented here in summary form, are substantiated by the analyses presented in the remaining chapters.

- This is the 8th comprehensive user charge study prepared for the City by this Consultant. There are no changes proposed herein with respect to the methods used to design user charge systems for the City. All changes were implemented for fiscal year 2000/01.
- It is important to note that as with all cost of service studies, the structure of the user charge systems have changed for some customer classes as a result of changes in customer wastewater characteristics and cost allocations. Equity is maximized if these rate structures are changed at least biennially. The changes found beginning with the March 2003 Study and through this 2008 Study are relatively insignificant compared to those found in the first two studies of April 1999 and April 2000.
- It is recommended that the City adopt the user charge systems proposed herein effective July 1, 2008 through June 30, 2009 in order to maximize rate equity and ensure adequate revenues. It is further recommended that this study be updated in its entirety next year because of the many variables that continue to change.

Abbreviations and Symbols Used in the Report

BOD	biochemical oxygen demand
CIP	capital improvement program
Ccf	hundred cubic feet
City	City of Livermore
District	Dublin San Ramon Services District
EBDA	East Bay Dischargers Authority
FY	fiscal year
I/I	infiltration/inflow
Gpcd	gallons per capita per day
Gpd	gallons per day
LAVWMA	Livermore-Amador Valley Water Management Agency
lb	pound (s)
mg	millions of gallons
mgd	millions of gallons per day
mg/l	milligrams per liter
M lb	thousand pounds
SS	suspended solids
SWRCB	State Water Resources Control Board
USEPA	U.S. Environmental Protection Agency

CHAPTER 2

CUSTOMER WASTEWATER CHARACTERISTICS

The City of Livermore (City) provides wastewater collection and treatment services to customers located in the City. The City also provides source control services to City wastewater customers. Wastewater disposal service for the City is provided by the Livermore-Amador Valley Water Management Agency (LAVWMA) which conveys treated effluent from the City's Water Reclamation Plant (WRP) to interceptor and outfall facilities of the East Bay Dischargers Authority (EBDA) for disposal into San Francisco Bay. The current population of the City's service area is estimated at 82,845 exclusive of the Ruby Hills area of Pleasanton served by the City of Livermore.

In order to recover costs of providing these various wastewater services from City wastewater customers according to the cost of providing service for each customer, these customers must be identified and the characteristics of their wastewater specified. Peak monthly discharges of flow, biochemical oxygen demand (BOD), and suspended solids (SS) and annual discharges of volume, BOD, and SS must be documented for various user classes and for large individual users to facilitate the development of an equitable rate structure in which user charges are based on both the quantity and strength of wastewater discharged. The purpose of this chapter is to identify and document current customer wastewater characteristics and to project customer wastewater characteristics for the defined study period, fiscal year 2008/09. Analyses for the Source Control Program are developed separately in Chapter 6.

Current Customer Wastewater Characteristics

Before customer wastewater characteristics could be projected for the defined study period, it was necessary to determine current customer wastewater characteristics. These use characteristics were determined from discussions with City staff and analyses of City and California Water Service water consumption records, City wastewater billing records, monthly Water Reclamation Plant operations reports, wastewater monitoring records for industrial customers, and current demographic data provided by the City. These discussions and analyses are summarized in the subsections that follow.

User Classes. Because there are nearly 27,000 wastewater customers in the service area, it is not practical to analyze each individual customer. Such an investigation would be extremely time-consuming and costly and is not necessary because most customers can be grouped into classes based on common characteristics. Only customers who place significant demands (in terms of either quantity or strength of wastewater discharged) on the wastewater system must be analyzed individually because of the impact they have on the user charge rate structure. These demands are unique and are not common to any group of customers. The user classifications that are used in this study are listed and defined below:

1. **Residential.** Residential users are segregated as either "single-family," "condominium," or "multiple-family." "Multiple-family" includes any residential dwelling unit designed to house one family in a building containing more than two such units, including triplexes, quadplexes, and apartments. "Multiple-family" also includes mobile homes located in a mobile home park and granny units that are second dwelling units constructed on parcels originally designed for one single-family dwelling unit. "Condominium" includes any residential dwelling unit located on a single lot, either in fee or air space, when attached to one or more residential dwelling units, including condominiums and townhouses. "Single-family" units are defined as any residential dwelling unit designed to house one family and not defined as being condominium or multiple-family, and include detached units, duplexes, and mobile homes not located in mobile home parks.

2. **Commercial.** All retail stores, restaurants, office buildings, laundries, and other common business and service establishments including churches and lodges are classified as commercial users. Commercial users are further segregated into categories according to the strength of wastewater discharged. These categories include automobile steam cleaning, bakeries, commercial laundries, grocery stores with garbage disposals, mortuaries, restaurants, and domestic-strength (i.e., all other) commercial users.

3. **Industrial and Demand Users.** Industrial and demand users include all users that are billed individually based on monitored wastewater discharged. These users place significant demands (either quantity or strength of wastewater discharged) on the Water Reclamation Plant. California Revenue Program Guidelines require that industrial users discharging more than 25,000 gallons per day (gpd) or using five percent or more of design capacity have costs allocated individually.

4. **Institutional.** Institutional users include public and private schools and hospitals and governmental facilities.

5. **Septage Haulers.** California Revenue Program Guidelines require that septage haulers be listed as a separate user group. There are currently no Septage haulers that are discharging to the WRP.

6. **Outside Municipalities.** California Revenue Program Guidelines require that any outside municipality discharging to the treatment plant be listed separately.

7. **Infiltration/Inflow (I/I).** System capacity required to convey and treat surface water and groundwater that enters through collection system defects, costs of which are allocated to the number of connections.

8. **Unaccountable BOD and TSS Loadings.** BOD and SS loadings that cannot be accounted for, costs of which are allocated to the BOD and SS parameters.

9. **Future Use.** Capacity provided for growth in system use beyond existing levels, costs of which are recovered from new users via connection fees.

Water Reclamation Plant Flows and Loadings. Historical daily and monthly City Water Reclamation Plant flows and loadings are presented in Tables 1 and 2, respectively. Water Reclamation Plant flows for fiscal year 2006/07 averaged 7.213 million

Table 1. Wastewater Discharges For Fiscal Year 2006/07 Of Daily Flow, BOD & SS Loadings

Month	Flow, mgd	BOD		SS	
		mg/l	M lb/day	mg/l	M lb/day
2007					
January	7.102	382	22.63	320	18.95
February	7.495	298	18.63	260	16.25
March	7.411	366	22.62	312	19.28
April	7.094	329	19.46	280	16.57
May	7.121	338	20.07	300	17.82
June	7.211	288	17.32	280	16.84
2006					
July	7.218	279	16.80	280	16.86
August	7.200	276	16.57	310	18.61
September	7.085	346	20.44	330	19.50
October	7.184	449	26.90	400	23.97
November	7.180	348	20.84	330	19.76
December	7.275	420	25.48	480	29.12
Average	7.213	343	20.65	323	19.46

Table 2. Wastewater Discharges For Fiscal Year 2006/07 Monthly Flow, BOD & SS Loadings

Month	Flow, mg	BOD		SS		Number of days
		mg/l	M lb	mg/l	M lb	
2007						
January	220.152	382	701.38	320	587.54	31
February	209.865	298	521.58	260	455.07	28
March	229.738	366	701.26	312	597.80	31
April	212.809	329	583.92	280	496.95	30
May	220.740	338	622.25	300	552.29	31
June	216.323	288	519.59	280	505.16	30
2006						
July	223.758	279	520.65	280	522.52	31
August	223.198	276	513.77	310	577.06	31
September	212.538	346	613.31	330	584.95	30
October	222.700	449	833.94	400	742.93	31
November	215.396	348	625.15	330	592.81	30
December	225.523	420	789.96	480	902.81	31
Total	2,632.740	344	7,546.75	324	7,117.89	365

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gallons per day (mgd) with average BOD and SS concentrations of 343 milligrams per liter (mg/l) and 323 mg/l, respectively. The peak month for flow was in February 2007 at 7.495 mgd mgd, the peak month for BOD was in December 2006 in the amount of 25,480 pounds per day (ppd), and the peak month for SS was in December 2006 in the amount of 29,120 ppd. Historical annual flows and loadings are summarized below:

Year	Annual Influent Flows & Loadings		
	Annual flow, mgd	BOD, mg/l	SS, mg/l
2006/07	7.2	343	323
2005	7.2	270	256
2003	6.6	301	260
2002	6.4	296	260
2001	6.2	254	294
2000	6.2	253	232
1999	6.2	218	206
1998	6.5	243	227

Historical peak month flows and loadings are summarized below:

Year	Peak Influent Flows & Loadings		
	Peak flow, mgd	BOD, ppd	SS, ppd
2006/07	7.495	25,480	29,120
2005	7.774	19,330	17,670
2003	7.068	21,310	18,770
2002	7.053	18,000	16,920
2001	6.574	17,750	17,860
2000	6.846	17,170	14,730
1999	6.492	13,640	13,800
1998	8.014	13,370	12,960

In the April 2004 Study, it was noted that over the prior five years, there was little change in flows but there were increases in BOD and SS and that this was contrary to the growth that had occurred over these years but then rainfall was normal or below normal for the prior three years and higher than normal five years ago in 1998. In the 2006 Study, flows had increased as would be normally expected, by 11 percent or by 1.5 percent annually over the prior seven years. In this 2008 Study, flows remained constant despite growth over two years though last year did have below normal rainfall. BOD and SS, however, increased more than would be expected over the past two fiscal years or by 27 percent and 26 percent, respectively.

Water Reclamation Plant Balance. To determine residential flows and domestic-strength BOD and SS concentrations, known flows and loadings must be balanced

to the influent flows and loadings recorded at the City's wastewater treatment plant. Residential flows and infiltration/inflow for fiscal year 2006/07 are estimated by deducting the total winter month metered water usage of commercial and institutional users together with flows from industrial and demand users and seepage haulers from the average dry-weather influent metered at the City's Water Reclamation Plant. Per capita flows are then determined by dividing the estimated residential and infiltration /inflow flows by the sewered population. The latter was based new demographic data supplied by the City.

The determination of residential wastewater flows and infiltration/inflow for fiscal year 2006/07 is presented in Table 3. As shown in Table 3, monthly flows varied from 62.2 gallons per capita per day (gpcd) to 67.7 gpcd for fiscal year 2006/07, as compared to calendar year 2003 estimates 68.4 gallons gpcd to 79.6 gpcd, calendar year 2003 estimates 59.5 gallons gpcd to 70.2 gpcd, calendar year 2002 estimates of 59.5 gallons gpcd to 72.3 gpcd calendar year, 2001 estimates of 62.3 gallons gpcd to 69.1 gpcd, calendar year 2000 estimates of 63.8 gpcd to 74.0 gpcd, calendar year 1999 estimates of 66.1 gpcd to 73.3 gpcd and fiscal year 1997/98 estimates of 57.9 gallons gpcd to 97.8 gpcd. Normally, the higher gpcd flows that occurred during the wet-weather months of November through March are attributable to infiltration/inflow, and the lowest gpcd flows are most likely attributable to residential sewer discharges. The balance of wastewater flows entering the Water Reclamation Plant is attributable to unaccountable flows and infiltration/inflow.

Based on gpcd flows developed in Table 3, residential flows are estimated with a balance to the WRP to be 66.83 gpcd for an average of 188 gpd per dwelling unit which are shown below with historical estimates:

Year	Plant Flows per Capita, gpd	Plant Flows per Dwelling, gpd	Winter Water Use Per Single-family Dwelling, gpd
2006/07	66.83	188	223
2005	70.12	198	209
2003	62.67	177	204
2002	64.43	182	233
2001	65.89	184	246
2000	69.64	189	210
1999	68.37	187	217
1998	59.0	161	232

Residential winter water use data has not yet been available from the Cal Water service area for comparison purposes. Residential winter water use estimates for the City's water service area are shown above but only for single-family residential customers. Because flows are lower for condominiums and multiple-family dwelling units, the flows shown above are not directly comparable. Note that the April 1999 Study plant balance estimate of 59.0 gpcd appears low with 70 gpcd common except during drought. Though the data is incomplete, winter water use appears to be greater than the plant balance when it would be expected to be equal or slightly greater than the plant balance. Data for the western valley at

Table 3. Determination Of Residential Flows & Infiltration/Inflow For Fiscal Year 2006/07

Description	2007 January	February	March	April	May	2007 June	2006 July	August	September	October	November	2006 December	Average annual
Wastewater Flows, mgd	7.1017	7.4952	7.4109	7.0936	7.1206	7.2108	7.2180	7.1999	7.0846	7.1839	7.1799	7.2749	7.2145
Nonresidential Flows, mgd													
Monitored Wastewater													
Industrial	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LLNL	0.2564	0.3601	0.3481	0.2797	0.2727	0.2684	0.2880	0.2931	0.2602	0.2539	0.2544	0.2279	0.2802
Flat Rate	0.0178	0.0178	0.0178	0.0178	0.0178	0.0178	0.0178	0.0178	0.0178	0.0178	0.0178	0.0178	0.0178
Winter Water Use													
Commercial	1.0570	1.0570	1.0570	1.0570	1.0570	1.0570	1.0570	1.0570	1.0570	1.0570	1.0570	1.0570	1.0570
Schools	0.1810	0.1810	0.1810	0.1810	0.1810	0.0000	0.0000	0.0000	0.1810	0.1810	0.1810	0.1810	0.1357
Institutional	0.1851	0.1851	0.1851	0.1851	0.1851	0.1851	0.1851	0.1851	0.1851	0.1851	0.1851	0.1851	0.1851
Total Nonresidential Flows, mgd	1.6973	1.8011	1.7890	1.7206	1.7136	1.5284	1.5480	1.5530	1.7012	1.6948	1.6953	1.6688	1.6759
Less Ruby Hills*	0.2004	0.2004	0.2004	0.2004	0.2004	0.2004	0.2004	0.2004	0.2004	0.2004	0.2004	0.2004	0.2004
City Residential & I/I Flows, mgd	5.2040	5.4937	5.4215	5.1726	5.2067	5.4820	5.4697	5.4465	5.1831	5.2887	5.2842	5.4057	5.3382
Sewered Population**	82,845	82,957	83,068	83,180	83,291	83,403	80,837	81,172	81,506	81,841	82,176	82,510	82,399
Residential & I/I Flows, gpcd	62.8	66.2	65.3	62.2	62.5	65.7	67.7	67.1	63.6	64.6	64.3	65.5	64.8

*Flows from Ruby Hills are estimated to be 911 dwelling unit equivalents that are not included in the population served estimate though include about 877 homes.

**CA Department of Finance data: Vacancy rate of 1.83 % & household size of 2.81 persons per dwelling for a 1-01-06 population of 78,829 & a 1-01-07 population 82,845

June - August	Residential	66.83	gpcd or	188	gpd/dwelling.		Winter Water Use	WRP	@220			@220
	Peak I/I	(0.0503)	mgd.			Single-family 2002	233	194				
	Annual I/I	(61.25)	mg.			Single-family 2003	204	184		Peak I/I		-0.7093
March - May	Residential	63.32	gpcd or	179	gpd/dwelling.	Single-family 2005	209	206				
	Peak I/I	0.2386	mgd.			Single-family 2007	223	189	220	Annual I/I		-100.45
	Annual I/I	44.29	mg.			Condominiums 1999	114	96	150			
						Multiple-family 1999	201	170	130			
11-Jan-08	Revised					Average SF CD MF =	211	179	208			

the DSRSD treatment plant is summarized below for comparison though note that the winter water use data is for all residential dwelling units and not just single-family dwelling units as is the case for the City's data:

Year	DSRSD Residential Customer Classes, gpd		
	Sewer flows per capita	Sewer flows/dwelling	Winter water use/dwelling
2003	61.1	171	221
2002	65.6	184	221
2001	61.8	174	193
2000	71.7	201	226
1999	65.4	183	216
1998	70.9	198	183
1997	69.0	194	202
1997	70.5	199	202
1996	70	190	190

The City's WRP balance is considered to be a good balance that clearly indicates that historical flows of 280 gpd per dwelling unit used for historical rate design until implementation of the April 1999 Study was far too high. Residential flows in the western valley clearly decreased substantially over the 1990's but this was only apparent after the drought. Historical single-family flows in the western valley used for rate design until 1999 were 243 gpd for a single-family residence which is remarkably close to single-family winter water use in the City's water service area of 246 gpd estimated in the April 2000 Study. All permits in the valley are based on a flow allocation of 220 gpd per dwelling unit equivalent, as compared to the historical allocation of 280 gpd. The western valley implemented in 1999 new residential flow allocations for user charge design of 220 gpd for single-family, 155 gpd for condominiums and 130 gpd for multiple-family units. The averages for 1997 through 2003 for condominiums and multiple-family units for the western valley were 144 gpd and 123 gpd, respectively, but these new estimates were not implemented; user charge design in the western valley is 150 gpd and 126 gpd, respectively. These estimates have been used for City rate design because this data is not yet readily available; current design for the City is 150 gpd and 130 gpd, respectively, and projected design for the City is also 150 gpd and 130 gpd, respectively. Single-family user charge design is still fixed at 220 gpd.

Though the City just changed its dwelling unit equivalent allocation from 220 gpd to 180 gpd, user charge design for single-family residential customers remains at 220 gpd, given the results of annual studies for the western valley since 1977 and the City's seven studies, until such time that it is clear that use is greater or less. There is no data currently available to change the City's past practice of assessing other residential customers at seventy-five percent of the single-family rate. Accordingly, estimates for the western valley after considerable study were used for the City beginning with the April 1999 Study.

The balance of flows not assigned to the customer use classes are allocated to infiltration/inflow. Based on residential use of Based on residential use of 66.83 gpcd, peak month I/I and annual I/I are estimated to be negatives of 0.05-mgd and a 0.017-mg,

respectively, or not even remotely close to estimates for the western valley. These estimates together with historical estimates are shown below:

Year	Residential flows, gpcd	Peak month I/I, mgd	Annual I/I, mgd
2006/07	66.8	(0.05)	(0.017)
2005	70.1	0.39	82.6
2003	62.7	0.36	2.80
2002	64.4	0.60	(0.03)
2001	65.9	0.24	(0.06)
2000	69.6	0.30	0.03
1999	68.4	0.29	0.16
1998	59.0	0.72	0.86

If residential winter water use is used for along with sanitary flow estimate of 220 gpd per single-family dwelling, I/I flow estimates have turned negative in prior City's studies, or 0.11-mgd and 113-mg, respectively, in the 2004 Study and . It seems highly unlikely that the City has that much exfiltration, though it appears there may be some. Projections in the 2004 Study assumed no I/I instead of exfiltration. In the 2006 Study, I/I estimates were lowered to 0.3130 mgd for the peak month and to 32.22 mg annually in order for the sum of all customer flows to be equal to those at the City's Water Reclamation Plant. In this 2008 Study, I/I is assumed to be zero.

Residential and I/I estimates for the western valley for Pleasanton, Dublin, and southern San Ramon are summarized below:

Year	Residential flows, gpcd	Peak month I/I, mgd	Annual I/I, mgd
2003	61.1	2.79	1.11
2002	65.6	1.78	0.53
2001	61.8	2.02	0.55
2000	71.7	2.69	0.35
1999	70.0	1.70	0.36
1999	65.4	2.12	0.49
1998	71.6	2.84	1.69
1998	70.9	2.81	1.67
1997	70.5	1.85	0.33
1997	69.0	2.00	0.49
1996	64	4.61	1.44
1996	70	4.12	0.94
1994	55	1.26	0.57
1992	53	2.05	0.72
1990	68	1.70	0.33
1988	58	1.03	0.06

Year	Residential flows, gpcd	Peak month I/I, mgd	Annual I/I, mgd
1986	72	2.37	0.36
1984	72	0.99	0.48
1982	72	1.00	0.34

In the City's April 1999 Study, it was noted that the City's fiscal year 1997/98 residential estimate of 59.0 gpcd appeared low compared to recent and historical estimates for the west. In fact, similar estimates for the west were only found during drought years. I/I estimates for the City appear reasonable because other studies have found I/I estimates for the eastern valley to be lower than the western valley. In recent City studies, the residential flow estimates appear quite good and are increased a bit when assigning flows of 220 gpd for single-family, 150 gpd for condominiums, and 130 gpd for multiple-family. This lowered I/I estimates for the City to slightly negative amounts in prior studies and to minimal positive amounts in the 2006 Study. These adjustments then cause all estimates of customer wastewater characteristics to equal discharges recorded at the WRP. In this 2008 Study, I/I is assumed to be zero though the estimates are negative.

Domestic-strength BOD and SS concentrations are estimated using a similar deductive process. Nondomestic loadings are first established for high-strength users using wastewater monitoring records for industries, demand users, and septage haulers, and typical wastewater strengths for high-strength commercial users based on samples obtained from similar operations in other communities. During fiscal year 2006/07, high-strength users included industries, automobile steam cleaning, bakeries, commercial laundries, grocery stores with garbage disposals, mortuaries, and restaurants.

Loadings from these high-strength users are subtracted from total measured influent loadings to yield total domestic loadings attributable to residential users, institutional users, and domestic-strength commercial users. The net loadings attributable to each of these user classes are then derived by proportioning the total domestic loadings to each domestic-strength user class according to the flows assignable to each user class. BOD and SS loadings are not assigned to estimated I/I. Domestic-strength BOD and SS concentrations obtained by this method are estimated in Table 4 to be 324 mg/l and 312 mg/l, respectively, and are summarized below together with historical estimates:

Year	BOD, mg/l	SS, mg/l
2006/07	324	312
2005	265	257
2003	270	234
2002	251	228
2001	215	264
2000	233	220
1999	216	224
1998	215	230

Table 4. Determination Of Domestic-Strength BOD & SS Concentrations For FY 2006/07

Description	Volume,	BOD		SS	
	mg	mg/l	M lb	mg/l	M lb
Water Reclamation Plant Loadings	2,632.74	344	7,546.75	324	7,117.89
High-strength Users					
Automobile Steam Cleaning	0.20	1,150	1.96	1,250	2.13
Bakeries	0.17	1,000	1.39	600	0.83
Commercial Laundries	2.70	450	10.15	240	5.41
Markets with Garbage Disposals	22.03	800	146.98	800	146.98
Mortuaries	0.75	800	5.03	800	5.03
Restaurants	42.79	1,000	356.84	600	214.11
Industrial Customers	102.29	106	90.35	102	86.79
Other					
Total, High-Strength Users	170.93	430	612.70	324	461.28
Estimated I/I	(100.45)	0	0.00	0	0.00
Domestic-Strength Users					
Residential with Ruby Hills	2,171.02	324	5,875.27	312	5,640.19
Other Commercial & Flat Rate	323.67	324	875.94	312	840.89
Institutional	67.57	324	182.85	312	175.53
Total, Domestic-Strength Users	2,562.26	324	6,934.05	312	6,656.61
2006 Study		265		257	
2004 Study		270		234	
2003 Study		251		228	
2002 Study		215		264	
2001 Study		233		220	
2000 Study		216		224	
1999 Study		215		230	
Average, 2008 - 1999 Studies		249		246	
User Charge Design		249		246	

Table 5. Determination Of Unaccountable BOD & SS Loadings For Fiscal Year 2006/07

Description	Volume,	BOD		SS	
	mg	mg/l	M lb	mg/l	M lb
Water Reclamation Plant Loadings	2,632.74	344	7,546.75	324	7,117.89
High-strength Users					
Automobile Steam Cleaning	0.20	1,150	1.96	1,250	2.13
Bakeries	0.17	1,000	1.39	600	0.83
Commercial Laundries	2.70	450	10.15	240	5.41
Markets with Garbage Disposals	22.03	800	146.98	800	146.98
Mortuaries	0.75	800	5.03	800	5.03
Restaurants	42.79	1,000	356.84	600	214.11
Industrial Customers	102.29	106	90.35	102	86.79
Other	0.00	0	0.00	0	0.00
Total, High-Strength Users	170.93	430	612.70	324	461.28
Estimated I/I	(100.45)	0	0.00	0	0.00
Domestic-Strength Users					
Residential with Ruby Hills	2,171.02	249	4,502.79	246	4,455.30
Other Commercial & Flat Rate	323.67	249	671.31	246	664.23
Institutional	67.57	249	140.14	246	138.66
Total, Domestic-Strength Users	2,562.26	249	5,314.24	246	5,258.19
Estimated Unaccountable BOD and SS			1,619.82		1,398.42

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Most of these estimates for the City are good estimates and there were likely no unaccountable BOD and SS being discharged by an unidentified customer(s). However, the domestic-strength estimates of BOD and SS concentrations were on the high side in the 2006 Study and now are way too high in this 2008 Study. Study projections are based on averages for these eight years of 249 mg/l for BOD and 246 mg/l for SS, and both are considered normal for domestic-strength sewer concentrations though somewhat high. Use of these averages does result in unaccountable BOD and SS of but these estimates are not carried forward to study projections. However, estimated unaccountable BOD of 1,619.82 M lb and unaccountable SS of 1,398.42 M lb warrant investigation because these are very large amounts.

For comparison to the City's estimated domestic-strength BOD and SS concentrations of 249 mg/l and 246 mg/l, respectively, historical estimates for the western valley are summarized below:

Year	Domestic-Strength Estimates	
	BOD, mg/l	SS, mg/l
2003	168	253
2002	194	266
2001	206	243
2000	208	317
1999	202	201
1998	246	270
1997	233	237
1996	414	445
1994	398	432
1992	297	318
1990	226	258
1988	229	296
1986	173	169
1984	175	144
1982	195	209
1980	242	226
1976	237	175

Note that the high estimates for DSRSD before 1997 for domestic-strength BOD and SS were due to new recycling from the sludge ponds and during the drought were due to low flows with the same pounds of BOD and SS. In very early years, the high concentrations were believed due to significant quantities of BOD and SS being discharged by an unidentified source that has ceased these dischargers. The then new industrial waste program probably began identifying a greater percentage of the BOD and SS discharged by various users tributary to the system. The 1994 and 1996 Studies concluded that new recycling of effluent from the sludge ponds made it no longer possible to obtain a good mass balance of BOD and SS loadings. As a result, domestic-strength concentrations were assumed and it was not possible to know if there are BOD and SS discharges by a source not identified as was believed in early years due to high strength industries that have since ceased operations. The 1998 Study found that this double counting due to this recycling of effluent had been

corrected. The 1999 Study had similar findings, except the BOD and SS concentrations appear a bit high possibly due to the use of the DLDS for storm overflows for the first time. The 2000 Study found historical levels of BOD and SS concentrations, and the 2001 Study found high SS due to the odor control problems then. Adjusting for unusual BOD and SS concentrations, averages for the western valley for 1996 through 2003 are 201 mg/l for BOD and 234 mg/l for SS as compared to City of Livermore averages for 1998 through 2006/07 249 mg/l and 246 mg/l, respectively, for BOD and SS.

Current User Characteristics. Current customer wastewater characteristics are based on the following assumptions but are not the basis for user charge design as discussed when projecting customer wastewater characteristics in the next section.

1. **Residential.** Current residential use characteristics are based on Tables 3 and 4 proportioned to the three residential customer classes based on 220 gpd, 150 gpd, and 130 gpd for single-family, condominium, and multiple-family residential customer classes. BOD and SS concentrations are estimated to be 249 mg/l and 246 mg/l, respectively. The flow balance for fiscal year 2006/07 of 66.83 gpcd yields flows averaging of 188 gpd for all dwelling units as compared to 223 gpd per dwelling for winter water use in the City's water service area for just single-family residential dwelling units.

2. **Commercial.** Wastewater flows are ascertained from winter month metered water delivered per City and Cal Water based on an estimated average discharge of 312 days annually. The billing units are equal to the total annual metered water delivered. Winter and annual water use was not before available for Cal Water so sewer to water ratios for the west were used until the 2003 Study when the City supplied far better consumption data by customer class and for nonresidential customers of Cal Water, too. The nonresidential sewer to water use ratios are mostly reasonable for calendar year 2005, though in this study and other studies some of the nonresidential sewer to water use ratios that were clearly too high and some were clearly too low though for the nonresidential classes as a whole the ratios were as expected. In the 2001 Study, these estimates were suspect probably due to having only half a year of data beginning in July 2000 with the new City's new sewer user charge billing system. This was also the case in the first two studies and was thought to be due to inclusion of irrigation only services or the lack of irrigation only services because City sewer billings were not before based on water use, as is common practice in California. These ratios are important for rate design because lower ratios caused lower user charges, and vice versa. Good ratios are required to achieve rate equity between the customer classes, and ratios do change over time due to weather, pricing of water and sewer, and in the case of the west increasing numbers or irrigation only meters cause the ratios to increase over time. Minimal changes were made to the ratios used previously so as to cause only minimal changes in user charge design until another year's data is analyzed. This approach should lead to more stable user charges over time, and avoid increases and decreases from year to year. This approach is also consistent with flat residential rates that do not increase and decrease as flows change in response to drought. Historical and projected sewer to water use ratios are:

Sewer To Water Use Ratios for Commercial & Institutional Customer Classes

Customer Class	New Design	Old Design	Avg 05 & 07	Avg 01 - 07	Calendar Year				
					2006/07	2005	2003	2002	2001
Commercial									
Auto Steam	99%	98%	99%	84%	99%	100%	29%	72%	120%
Bakeries	97%	97%	96%	93%	95%	97%	86%	88%	99%
C. Laundries	98%	98%	102%	99%	97%	106%	93%	100%	97%
Markets	96%	96%	98%	96%	101%	94%	96%	87%	101%
Mortuaries	96%	96%	48%	44%	58%	38%	28%	63%	31%
Restaurants	97%	97%	97%	94%	94%	101%	91%	86%	97%
All Other	82%	83%	89%	82%	80%	97%	76%	77%	78%
All Commercial	84%	85%	90%	84%	83%	97%	78%	79%	81%
Institutional									
Schools	35%	36%	31%	36%	35%	26%	45%	33%	40%
All Other	55%	55%	148%	102%	181%	114%	89%	66%	60%
All Institutional	36%	37%	37%	39%	44%	30%	47%	34%	40%

BOD and SS concentrations for commercial users were obtained from samples of similar businesses in other communities and from Tables 4 and 5 for current use and from the residential balance for projected use. Concentrations used are shown below:

Classifications	BOD, mg/l	SS, mg/l
Automobile steam cleaning	1,150	1,250
Bakeries	1,000	600
Commercial laundries	450	240
Grocery stores with disposals	800	800
Mortuaries	800	800
Restaurants	1,000	600
All other – 2003 Study	226	233
All other – 2004 Study	233	233
All other – 2006 Study	238	237
All Other – 2008 Study	249	246

3. **Industrial and Demand Users**. During fiscal year 2006/07, there was only one industrial type customer being the Livermore/Sandi labs that discharged wastewater to the City's Water Reclamation Plant. Wastewater discharged from each industry is sampled by Source Control staff and an invoice is prepared monthly. Invoices for the labs are annual and until the latter of half of fiscal year 2003/04 were based on a 1963 agreement and subsequent amendments that did not reflect cost of services provided by the City. Projections are based on the amended agreement based on the recommendations of the prior user charge studies.

4. **Institutional**. Wastewater flows for schools and all other institutional customers were estimated based on water records and estimated annual discharges of 180 days and 312 days, respectively. The billing units are based on total annual metered water delivered. Domestic-strength BOD and SS concentrations are used.

5. **Infiltration/Inflow**. Peak month I/I for fiscal year 2006/07 is estimated to have been a negative 0.0503 mgd and annual I/I is estimated to have been a negative 61.25 mg in order for the previous flow estimates to balance to those at the WRP with the flow assumptions for residential customers. As previously discussed, these estimates change if higher or lower than 66.83 gpcd is assigned to residential use but is projected to be zero instead of negative. Infiltration/inflow is allocated to customers according to their respective number of connections to the wastewater system. Infiltration/inflow generally correlates well with the size of a collection system and the size of most public collection systems is matched by private lines connecting users to the system. Accordingly, higher I/I causes relative user charge increases for small users and decreases for large users. However, this is the fair and equitable means to allocate these costs.

6. **Unaccountable BOD and SS Loadings**. As previously discussed, domestic-strength BOD and SS concentrations estimated in Table 4 are high for BOD and high for SS. The domestic-strength estimates of BOD and SS concentrations were on the high side in the 2006 Study and now are way too high in this 2008 Study. Study projections are based on averages for the past seven studies and this 2008 Study of 249 mg/l for BOD and 246 mg/l for SS and both are considered normal for domestic-strength sewer concentrations though somewhat high. Use of these averages does result in unaccountable BOD and SS but these estimates are not carried forward to study projections. However, estimated unaccountable BOD of 1,619.82 M lb and unaccountable SS of 1,398.42 M lb warrant investigation because these are very large amounts.

Based on the previous analyses and discussions, current customer wastewater characteristics for City are presented in Table 6. Note that the Table 6 totals are nearly identical to discharges to the Water Reclamation Plant shown in Tables 1 and 2. However, this is not the case for forthcoming projections of customer wastewater characteristics because the negative I/I and large amounts of unaccountable BOD and SS shown in Table 6 are not carried forward.

Projected Customer Wastewater Characteristics

To project customer wastewater characteristics over the defined study period, fiscal year 2008/09, fiscal year 2006/07 customer wastewater characteristics must be escalated for projected changes in system use. Growth over calendar year 2006 was 1.7 percent or greater than the increase in flows for the past nine years. Growth is assumed to be 1.7 percent for nonindustrial use and zero for industrial use for the first year and one-third of that for the second year due to the slow down in new construction for a net increase of 2.28 percent from fiscal year 2006/07 to fiscal year 2008/09. Projected City customer wastewater characteristics are presented in Table 7. Note that these projections are best current estimates that are used for rate design and if adjusted for growth will match the influent flow, BOD and SS to the

Table 6. Current Customer Wastewater Characteristics For The City Of Livermore For Fiscal Year 2006/07

Customer Class	Number Of Users	Strength BOD, mg/l	Strength SS, mg/l	Annual Loadings Volume, mg	Annual Loadings BOD, M lb	Annual Loadings SS, M lb	Peak Month Loadings Flow, mgd	Peak Month Loadings BOD, lb/day	Peak Month Loadings SS, lb/day	Annual Billing Units Number	Annual Billing Units Type	Sewer/ Water Ratio
Residential												
Single-Family	21,974	249	246	1,772.46	3,676.16	3,637.38	4.8561	10,071.66	9,965.44	22,073	DU	
Condominiums	2,309	249	246	126.42	262.20	259.43	0.3464	718.34	710.77	2,309	DU	
Multiple-Family	452	249	246	199.01	412.75	408.39	0.5452	1,130.81	1,118.88	4,194	DU	
Subtotal, Residential	24,735	249	246	2,097.88	4,351.10	4,305.21	5.7476	11,920.82	11,795.09	28,576	DU	
Commercial												
Automobile Steam Cleaning	1	1,150	1,250	0.20	1.96	2.13	0.0007	6.28	6.82	277	Ccf	99%
Bakeries	2	1,000	600	0.17	1.39	0.83	0.0005	4.44	2.66	234	Ccf	95%
Commercial Laundries	3	450	240	2.70	10.15	5.41	0.0087	32.53	17.35	3,730	Ccf	97%
Markets With Disposals	11	800	800	22.03	146.98	146.98	0.0706	471.07	471.07	29,120	Ccf	101%
Mortuaries	1	800	800	0.75	5.03	5.03	0.0024	16.12	16.12	1,729	Ccf	58%
Restaurants	71	1,000	600	42.79	356.84	214.11	0.1371	1,143.73	686.24	60,850	Ccf	94%
All Other	841	249	246	317.18	657.84	650.90	1.0166	2,108.46	2,086.22	527,100	Ccf	80%
Subtotal, Commercial	930	367	319	385.82	1,180.2	1,025.4	1.2366	3,782.64	3,286.50	623,040	Ccf	83%
Institutional												
Schools	77	249	246	49.54	102.76	101.67	0.2752	570.87	564.84	190,346	Ccf	35%
All Other	5	249	246	18.02	37.38	36.99	0.0578	119.81	118.54	13,296	Ccf	181%
Subtotal, Institutional	82	249	246	67.57	140.14	138.66	0.3330	690.67	683.39	203,642	Ccf	44%
Industrial												
None	0			0.00	0.02	0.00	0.0000	0.00	0.00	0	Ccf	
Lawrence Livermore Lab	1	106	102	102.29	90.34	86.79	0.2684	272.88	268.34	136,736	Ccf	100%
Other (Flat Rates)	2	249	246	6.50	13.47	13.33	0.0250	51.83	51.28	8,685	Ccf	100%
Subtotal, Industrial	3	114	110	108.78	103.83	100.13	0.2934	324.70	319.62	145,421	Ccf	100%
Infiltration/Inflow	-	-	-	(100.45)			(0.7093)			-	-	-
Unaccountable	-	-	-	-	1,619.82	1,398.42	-	4,437.86	3,831.29	-	-	-
Total Current City Use	25,750	346	326	2,559.60	7,395.06	6,967.80	6.9013	21,156.69	19,915.89	-	-	-
Ruby Hills, Pleasanton	911	249	246	73.14	151.69	150.09	0.2004	415.59	411.20	911	DUE's	
Total Current WRP Use	26,661	344	324	2,632.74	7,546.75	7,117.89	7.1017	21,572.27	20,327.09			

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Table 7. Projected Customer Wastewater Characteristics For The City Of Livermore For Fiscal Year 2008/09

Customer Class	Number Of Users	Strength BOD, mg/l	Strength SS, mg/l	Annual Loadings Volume, mg	Annual Loadings BOD, M lb	Annual Loadings SS, M lb	Peak Month Loadings Flow, mgd	Peak Month Loadings BOD, lb/day	Peak Month Loadings SS, lb/day	Annual Billing Units Number	Annual Billing Units Type	Sewer/ Water Ratio
Residential					0							
Single-Family	22,474	249	246	1,812.81	3,759.84	3,720.18	4.9666	10,300.93	10,192.28	22,575	DU	
Condominiums	2,362	249	246	129.30	268.16	265.34	0.3542	734.70	726.95	2,362	DU	
Multiple-Family	462	249	246	203.54	422.14	417.69	0.5576	1,156.55	1,144.35	4,289	DU	
Subtotal, Residential	25,298	249	246	2,145.64	4,450.14	4,403.21	5.8785	12,192.17	12,063.58	29,226	DU	
Commercial												
Automobile Steam Cleaning	1	1,150	1,250	0.21	2.01	2.19	0.0007	6.45	7.01	283	Ccf	99%
Bakeries	2	1,000	600	0.17	1.45	0.87	0.0006	4.64	2.79	239	Ccf	97%
Commercial Laundries	3	450	240	2.80	10.50	5.60	0.0090	33.64	17.94	3,815	Ccf	98%
Markets With Disposals	11	800	800	21.39	142.70	142.70	0.0686	457.37	457.37	29,783	Ccf	96%
Mortuaries	1	800	800	1.27	8.47	8.47	0.0041	27.16	27.16	1,768	Ccf	96%
Restaurants	73	1,000	600	45.16	376.62	225.97	0.1447	1,207.12	724.27	62,235	Ccf	97%
All Other	860	249	246	330.68	685.85	678.62	1.0599	2,198.25	2,175.06	539,098	Ccf	82%
Subtotal, Commercial	951	366	318	401.68	1,227.60	1,064.42	1.2874	3,934.63	3,411.60	637,222	Ccf	84%
Institutional												
Schools	79	249	246	50.97	105.71	104.60	0.2832	587.30	581.11	194,679	Ccf	35%
All Other	5	249	246	5.59	11.60	11.48	0.0179	37.19	36.80	13,599	Ccf	55%
Subtotal, Institutional	84	249	246	56.57	117.32	116.08	0.3011	624.50	617.91	208,278	Ccf	36%
Industrial												
None	0	0	0	0.00	0.02	0.00	0.0000	0.00	0.00	0	Ccf	0%
Lawrence Livermore Lab	1	106	102	102.29	90.34	86.79	0.2684	272.88	268.34	136,736	Ccf	100%
Other (Flat Rates)	2	249	246	6.50	13.47	13.33	0.0250	51.83	51.28	8,685	Ccf	100%
Subtotal, Industrial	3	114	110	108.78	103.83	100.13	0.2934	324.70	319.62	145,421	Ccf	100%
Infiltration/Inflow Unaccountable				0.00			0.0000					
Projected City Use	26,336	261	251	2,712.67	5,898.89	5,683.83	7.7604	17,076.00	16,412.71			
Ruby Hills, Pleasanton	911	249	246	73.14	151.69	150.09	0.2004	415.59	411.20	911	DUE's	
Total WRP	27,247	260	251	2,785.80	6,050.58	5,833.92	7.9608	17,491.59	16,823.91			

*Growth over calendar year 2006 per CA Department of Finance data wa: 1.7% and projections are for two years but growth is assumed to have slowed to one-third of the 2006 rate in the second year due to the slow down of new housing construction o 2.28% net.

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Water Reclamation Plant over fiscal year 2006/07 except for the negative I/I and unaccountable BOD and SS estimates not carried forward as previously noted. The user classes and their respective proportion of peak month and annual flows and loadings are shown below:

Projected Customer Wastewater Use Characteristics

Customer Class	Number Meters	Annual Loadings			Peak Month Loadings		
		Flow,	BOD,	SS,	Flow,	BOD,	SS,
Residential	96%	80%	76%	78%	76%	72%	74%
Commercial	3%	14%	20%	18%	16%	22%	20%
Institutional	0.31%	2%	2%	2%	4%	4%	4%
Industrial	0.01%	4%	2%	2%	4%	2%	2%
Infiltration/Inflow		0%	0%	0%	0%	0%	0%
Unaccountable		0%	0%	0%	0%	0%	0%
Total	100%	100%	100%	100%	100%	100%	100%

Future Use. The City's Water Reclamation Plant (WRP) is designed for an average dry weather flow of 8.5 mgd. After deducting the average dry-weather flow of 7.21 mgd, 1.29 mgd will remain available for future use that is 15 percent of design capacity. This is 2 percent less design capacity as compared to two years ago and to prior estimates of 1.48 mgd estimated in the April 2006 Study, 2.09 mgd estimated in the April 2004 Study, 2.12 mgd estimated in the March 2003 Study, 2.34 mgd estimated in the March 2002 Study and 2.3 mgd estimated in the April 2000 Study.

CHAPTER 3

USER CHARGE REVENUE REQUIREMENTS

Annual user charge revenue requirements for a wastewater system include operation and maintenance (0 & M) costs, capital costs, and reserve accruals to fund costs of replacements. Operation and maintenance expenses and capital costs are incurred for normal operation of a wastewater system. Replacement reserve accruals are designed to fund future replacements for a wastewater system. User charges are designed to recover annual operating revenue requirements and replacement accruals in order to maintain fair and equitable rates over time and for the wastewater system to operate on a sound enterprise basis (i.e., remain self-sufficient, operate as a nonprofit business).

User charge revenue requirements for the City of Livermore (City) wastewater system are designed to fund services of collection, source control, laboratory, treatment, administration, and disposal. Federal and state regulations attendant to the existing grant and loan funded wastewater facilities of the City, LAVWMA and East Bay Dischargers Authority (EBDA) require the City to maintain wastewater a user charge system. This user charge system must recover as a minimum operation and maintenance expenses from City wastewater customers via user charges that are proportional to the cost of providing various wastewater services to each type of customer tributary to the wastewater system. In addition, the City's user charge system should also recover capital costs and replacement reserve accruals in order for the wastewater system to continue to be operated on a sound, enterprise basis and to thus remain self-sufficient.

The purpose of this chapter is two-fold. First, document historical wastewater system costs in order to determine a base-year normal level of expenditures. Second, project these costs for the defined study period, fiscal year 2008/09, based on anticipated changes in costs attributable to changes in system use, future inflation, and any extraordinary changes in operation and maintenance expenses and/or capital costs.

User Charge Revenue Requirements

Historical and projected City wastewater management costs for fiscal year 1997/98 through 2008/09 are presented in Table 8. Historical expenditures for fiscal years 1997/98 through 2006/07 were obtained from City accounting records. Expenditures for fiscal year 2007/08 are the current adopted budget and these are escalated for inflation and growth to estimate expenditures for next fiscal year 2008/09. Replacement reserve accruals are from the City's second long-term wastewater replacement financing study completed by this Consultant on February 19, 2006, and LAWMA costs are summarized from the June 2006 Revenue Program for fiscal years 2006/07 and 2007/08 approved by the LAVWMA Board of Directors, annual use and cost reconciliations approved by the LAVWMA Board, and preliminary estimates for next fiscal year 2008/09.

Table 8. Revenue Requirements For City Of Livermore Wastewater Management Facilities For Fiscal Years 1997/98 Through 2008/09

Major Cost Category	Fiscal Year Ending June 30, Dollars											
	Actual 1997/98	1998/99	1999/2000	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	Actual 2006/07	Budget 2007/08	Estimates 2008/09
Sanitary Sewer System												
Personnel Services	220,150	196,029	339,790	373,109	539,305	482,918	590,378	681,686	672,499	679,581	814,920	843,442
Services & Supplies	154,130	137,243	413,310	211,664	250,871	245,123	449,386	223,025	286,422	443,283	507,580	525,345
Utilities	1,500	1,336	1,540	1,631	3,205	1,858	3,236	3,606	3,992	5,212	2,700	2,851
Capital Outlays	1,500	1,336	9,200	3,406	0	0	0	5,860	0	0	10,000	10,350
Subtotal, Maintenance	377,280	335,943	763,840	589,809	793,381	729,899	1,043,000	914,177	962,913	1,128,076	1,335,200	1,381,989
Capital Improvement Program				241,188	325,671	622,895	438,676	224,529	515,170	0	3,478,000	0
Replacement Reserves*	0	0	0	0	0	211,321	792,453	947,864	3,645,631	1,502,000	1,633,243	1,771,777
Lateral Surcharges											(282,848)	(284,451)
Total, Collection System	377,280	335,943	763,840	830,997	1,119,052	1,564,115	2,274,129	2,086,570	5,123,714	2,630,076	6,163,595	2,869,315
Source Control												
Personnel Services	144,300	61,620	205,081	169,780	195,262	174,033	210,250	266,051	291,448	279,039	281,475	291,327
Services & Supplies	27,400	38,650	43,797	10,301	17,024	13,799	27,253	31,219	29,658	28,976	73,610	76,186
Capital Outlays	0	110	0	0	0	0	0	0	0	0	0	0
Total, Source Control	171,700	100,380	248,877	180,081	212,286	187,832	237,503	297,270	321,106	308,015	355,085	367,513
Water Reclamation Plant												
Administration												
Personnel Services	283,180	409,169	239,187	399,284	452,004	461,348	417,909	456,311	440,668	319,707	497,770	515,192
Services & Supplies	551,030	757,630	970,820	510,862	581,790	508,834	471,487	452,427	516,736	619,634	1,061,390	1,098,539
Property Taxes In Lieu	332,100	348,700	352,100	341,300	349,400	385,600	389,500	506,920	557,700	604,025	620,000	641,700
Billing Design	25,000	25,000	25,000	25,000	0	0	0	0	0	0	0	0
Customer Accounting	67,650	71,040	140,466	170,830	60,900	247,297	291,650	298,158	329,102	293,419	422,680	437,474
Engineering/Landscape	91,420	63,300	0	236,000	64,670	43,115	115,614	104,119	45,902	84,650	80,000	82,800
Retiree Health Benefits	0	0	0	0	0	0	0	0	30,260	35,450	268,300	277,691
Administrative Surcharge	0	0	0	742,300	768,300	779,100	798,695	808,500	824,300	850,800	877,000	907,695
Subtotal, Administration	1,350,380	1,674,839	1,727,573	2,425,576	2,277,064	2,425,294	2,484,855	2,626,435	2,744,668	2,807,686	3,827,140	3,961,090
Laboratory												
Personnel Services	183,910	181,420	211,283	227,486	158,818	231,115	293,945	316,847	340,461	352,486	377,480	390,692
Services & Supplies	115,730	106,390	128,293	111,692	105,291	76,395	87,764	85,187	94,592	99,300	163,560	169,285
Capital Outlays	12,000	73,180	0	6,222	14,490	2,974	0	0	0	0	10,000	10,350
Subtotal, Laboratory	311,640	360,990	339,576	345,399	278,599	310,484	381,709	402,034	435,053	451,786	551,040	570,326
Operations												
Personnel Services	1,138,940	963,486	752,454	985,342	1,025,608	1,327,914	1,782,453	2,020,893	2,292,339	2,373,446	2,385,460	2,468,951
Services & Supplies	49,643	562,696	437,563	465,491	426,297	615,363	470,923	1,032,922	792,596	760,150	704,572	729,232
Utilities	400,000	550,000	368,046	483,172	716,964	532,615	665,666	579,632	598,711	611,672	823,000	869,047
Sludge Disposal	222,326	180,452	188,758	180,488	171,081	165,765	205,000	214,638	217,683	217,989	250,201	264,200
Grit Disposal									15,071	14,816	15,537	16,406
Repairs & Maintenance	249,300	407,170	441,123	369,309	462,120	386,762	324,654	538,680	669,648	521,370	482,000	568,500
Chemicals												
Ferric Chloride	35,208	11,000	38,787	34,112	27,568	55,000	30,000	34,951	42,381	54,658	56,267	59,415
Sodium Hypochlorite	123,210	47,099	90,234	85,821	83,365	118,000	100,000	120,286	156,526	187,166	188,759	199,320
Polymer	217,034	271,221	171,543	220,000	156,971	185,000	126,955	154,169	121,185	135,468	154,219	162,847
Sodium Hydroxide	19,132	10,221	0	0	25,062	32,000	30,000	34,035	55,865	22,401	26,558	28,044
Other Chemicals	93,728	19,351	0	0	10,801	8,016	0	5,550	9,369	62,526	159,197	168,104
Capital Outlay	9,400	34,900	38,644	77,792	146,616	161,292	205,689	165,628	223,389	7,852	594,800	615,618
Subtotal, Operations	2,557,920	3,057,596	2,527,152	2,901,527	3,252,453	3,607,727	3,941,340	4,901,384	5,194,761	4,969,512	5,840,570	6,149,685
Phase V Loan Payment	65,000	65,000	65,000	65,000	65,000	65,000	65,000	65,000	65,000	65,000	65,000	65,000
Capital Improvement Program	0	0	0	325,843	0	134,687	680,243	797,712	427,871	966,679	1,068,400	0
Replacement Reserves*	0	100,000	100,000	1,650,000	520,000	108,679	407,547	352,136	1,354,369	558,000	606,757	658,223
Operating Reserves	5,000	100,000	200,000	738,729	600,000	(120,000)	750,000	600,000	600,000	874,000	530,000	0
Replacement Transfers In									0	(962,629)	(4,544,400)	
Ruby Hills, Other Income, SC***											(335,968)	(370,943)
Total, WRP	4,289,940	5,358,425	4,959,301	8,452,074	6,993,116	6,531,872	8,710,694	9,744,701	10,821,722	10,692,663	12,150,939	11,033,381
LAVWMA												
Debt Service	176,819	179,881	768,396	1,286,000	974,567	974,567	974,567	974,567	1,330,032	1,330,419	1,330,253	1,330,029
Replacement Reserve Accruals	501,275	580,871	717,094	491,565	249,227	368,576	264,617	272,520	227,664	234,878	241,092	253,147
Fixed O & M	371,588	349,322	415,759	424,835	306,601	343,342	361,404	522,981	337,443	426,872	441,813	457,276
Variable O & M	329,690	341,745	343,817	374,780	596,885	699,230	495,927	520,077	394,946	417,726	557,303	588,484
Total, LAVWMA	1,379,372	1,431,819	2,245,066	2,577,180	2,127,280	2,385,715	2,096,515	2,290,145	2,290,085	2,409,895	2,570,461	2,628,936
Total User Charge Requirements	6,218,292	7,226,567	8,217,085	12,040,332	10,451,734	10,669,534	13,318,842	14,418,686	18,556,626	16,040,649	21,240,080	16,899,145

*Replacement reserves are allocated between sanitary sewers and the WRP according to the City's February 2006 Replacement Financing Study.

**LAVWMA costs are from Annual Use & Cost Reconciliations based on Audit Reports and actual flows and the May 2006 Revenue Program for FYs 2006/07 & 2007/08 and estimates of inflation for fiscal year 2008/09. ***Ruby Hills & Other Income are shown in Table 16, and Source Control user charges are shown in Table 22. Revised 21-Feb-08

Fixed and Variable Costs. Anticipated cost increases are based on both anticipated inflation and growth in system use. Fixed costs do not change (within a large range of operation) as a result of changes in wastewater flows and loadings and include all costs except for expenditures for chemicals and utilities. Fixed costs are, therefore, escalated only for cost increases attributable to cost inflation. Variable costs, however, are incremental expenditures proportional to wastewater flows and loadings; and thus, increase (decrease) as wastewater flows and loadings increase (decrease). Variable costs include expenditures for chemicals and utilities. Because variable costs are incremental expenditures proportional to wastewater flows and loadings, projections of expenditures for variable costs must be adjusted to account for cost increases attributable to changes in system use. In Chapter 2, system use is assumed to increase due to non-industrial growth of 0.6 percent annually. Inflation has been and will continue to be the primary source of cost increases for most goods and services. Accordingly, projections of annual revenue requirements must incorporate anticipated cost increases attributable to inflation as well as anticipated growth. Escalation factors used in this 2008 Study are summarized below:

Escalation Factors for FY 2008/09

Cost Category	2008/09
Growth In Sewer Use*	0.6%
Inflation Rates	
Personnel Services**	3.5%
Services & Supplies	3.5%
Utilities***	5.0%
Sludge Disposal***	5.0%
Repairs & Maintenance	3.5%
Chemicals***	5.0%
All Other	3.5%
LAVWMA Replacement	5.0%

*Growth projections are from Table 7, Chapter 2.

**Personnel Services for inflation escalation also include Customer Accounting, Billing Design, Engineering, Fixed LAVWMA costs.

***Variable costs of electricity, sludge disposal & chemicals are also escalated for growth.

Operating Reserves. Operating reserves are required to meet cash flow requirements and to provide for contingencies. Cash flow requirements result from having to fund expenses before the associated revenue is received. In the case of the City's WRP Enterprise Fund, City residential customers are assessed user charges via property tax rolls

and nonresidential customers are billed monthly based on water consumption. Accordingly, the City begins fiscal year expenses on July 1 but does not receive most of its revenue until late December. In order to meet cash flow requirements, the City should hold as operating reserves one-half year of operating expenses inclusive of LAVWMA charges but exclusive of replacement reserve accruals allocable to residential customers and 1/12 of these same costs allocable to nonresidential customers billed monthly. Furthermore, five percent of operating expenses should be held in operating reserves for contingencies. Minimum operating reserves for fiscal year 2008/09 are estimated at $6.71 million. It is estimated that the City will have $4.26 million in operating reserves by the end of the fiscal year, June 30, 2008 as well as the City's Budgetary Operating Reserves of $8.04 million. The City also has replacement reserves of $13.1 million as of June 30, 2007 that are clearly inadequate though far improved from none nine years ago. Replacement reserves should not be used to meet operating cash flow requirements because then the funds may not be available for replacements and further are intended to earn interest income to contribute towards replacement costs. The City is continuing to budget to increase replacement reserves annually.

The City budgeted $5,000 for fiscal year 1997/98, $100,000 for fiscal year 1998/99, $200,000 for 1999/2000, $739,000 for fiscal year 2000/01, $600,000 for fiscal year 2001/02, a deficit of $120,000 for fiscal year 2002/03, $750,000 for fiscal year 2003/04, $600,000 for both fiscal years 2004/05 and 2005/06, $874,000 for fiscal year 2006/07, and $530,000 for current fiscal year 2007/08 to increase operating reserves. However, the delay to fully implement the April 1999 Study, new administrative surcharges of $779, 420 that were not in user charge design for fiscal year 2000/01 and fiscal year 2001/02, and the delay in amending the LLNL sewer service contract finds the City with only $4.4 million as of June 30, 2007 that is estimated to decrease to $4.3 million by June 30, 2008 due to delay of a year in reviewing the City's user charges. In prior studies, it was advised that the City had $4.0 million of surplus LAVWMA funds if the City did not participate in the LAVWMA expansion. These funds were to get the City over the estimated optimal reserve level but with the City's participation in the LAVWMA expansion, this LAVWMA surplus will be less and the reconciliation of that and the Export Facilities Project costs has not yet been done.

Replacement Reserves. The City's first long-term wastewater replacement financing study was completed by this Consultant on September 18, 2001, and this study was updated and expanded with completion by this Consultant on February 19, 2006. For those not familiar with long-term replacement financing programs, the purpose of establishing a replacement fund is two-fold. First, it ensures that future system users will not be unduly burdened by replacement costs as a result of existing system users not being assessed charges for depreciation. Second, it ensures that adequate funds will be available to fund replacements as required and to thus continue to meet wastewater management requirements. The replacement program is funded via uniform annual reserve accruals used to fund all future replacement costs on a pay-as-you-go basis without issuing debt. This pay-as-you-go financing alternative is significantly less expensive than the costs of issuing and funding long-term debt.

The City budgeted a replacement reserve accrual of $200,000 for fiscal year 2000/01. However, this was increased to $1.95 million in the April 2000 and in the April 2001 Study based on cursory estimates made from studies by this Consultant for Pleasanton's sanitary sewer system and DSRSD's wastewater treatment plant. The City's first long-term

replacement financing study was completed by this Consultant in September 2001, and the Proposed Gradual Funding alternative was incorporated in fiscal year 2002/03 user charges and in the fiscal year 2003/04 user charge system, though capital improvements offset a good portion of these accruals. Fiscal year 2004/05 user charge design that was also now applicable to fiscal year 2005/06 contained the September 2001 Study accrual for that year but less budgeted capital improvements (CIPs), or $1.3 million and $5.0 million, respectively.

The City's wastewater replacement financing study was entirely updated by this Consultant with completion on February 19, 2006. There are nearly 800 assets with estimates of current replacement costs of $385 million, current annual depreciation of $5.9 million, and past depreciation of $141 million. Replacement reserves are currently $13.1 million as compared to only $1.8 million in the 2001 Study. Replacement funding requirements are annual depreciation of $5.9 million and past depreciation of $141 million both of which increase annually for inflation. The 2006 Study shows that CIPs and all future replacements can be funded from a Sewer Replacement Fund separately from the Sewer Operations Fund via continuation of Gradual Funding implementation with a fiscal year 2006/07 sewer user charge replacement reserve accrual of $2.06 million which was then 13 percent of projected user charge revenue requirements and which are still 13 percent of projected user charge revenue requirements. Replacement reserves for current fiscal year 2007/08 are budgeted at $$2.24 million, and are projected to be $2.43 million for next fiscal year 2008/09; both are from the 2006 Replacement Financing Study.

LAVWMA Cost Projections. As previously discussed, LAVWMA fixed and variable costs were projected to increase for inflation and growth. Debt service costs are now based on actual March 2001 Series A debt service payments. It was recommended in previous studies, and the City so implemented, that user charges of member agencies need to be increased before and not after new LAVWMA debt is issued. Based on LAVWMA planning, debt service allocations to the City were estimated to increase from $183,897 for fiscal year 1999/00 to $1,604,857 for fiscal year 2000/01. Further increases were to occur annually until fiscal year 2005/06 when debt was estimated for the City at $2.7 million. It was proposed seven years ago that the City then increase user charges for fiscal year 2000/01 estimated debt of $1.6 million and it was noted that further user charge increases would be required, and would depend upon growth between now and fiscal year 2005/06 and actual construction costs and debt.

Since the April 2000 Study, the construction bids approved by LAVWMA were less than planning estimates and the Series A debt service payments were significantly less than planning estimates because of an interest rate of 4.98 percent as compared to 6.5 percent used for planning. This occurred because of declining interest rates in general and more specifically because of the then declining stock market. Actual Series A debt service payments for the City for LAVWMA were $974,567 and increased to $1,330,032 for fiscal year 2005/06 with principal payments that began on August 1, 2005. These debt payments are significantly less than planning estimates but there has since been other annual cost increases.

Summary of Projected Revenue Requirements

Total user charge revenue requirements are projected to increase from $6.2 million for fiscal year 1997/98 to $17.6 million eleven years later for next fiscal year 2008/09. Historical and projected user charge revenue requirements are summarized below. Note that some of bumps are due to costs of capital improvements with none contained in next fiscal year 2008/09 beyond the replacement reserve accrual.

Fiscal Year	User Charge Revenue Requirements, Millions
2008/09	$17.6
2007/08	$21.3
2006/07	$15.2
2005/06	$18.0
2004/05	$13.8
2003/04	$12.6
2002/03	$10.8
2001/02	$9.9
2000/01	$11.3
1999/00	$8.0
1998/99	$7.1
1997/98	$6.2

The study of March 2002 found the need for an 11 percent user charge increase for fiscal year 2002/03 that was allocable 6 percent to a new administrative surcharge per a DMG Study, 2 percent to higher customer accounting costs, 1 percent to the need to amend the sewer service contract with LLNL with that contained in operating reserves, 1 percent for increasing operating reserves, and 1 percent for other cost increases. The 2003 Study found costs having stabilized and a user charge increase of only 2.1 percent was proposed and implemented. A 2.8 percent inflationary user charge increase was proposed and implemented for fiscal year 2004/05 in the April 2004 Study. A 2 percent user charge increase was proposed in the April 2006 Study for fiscal year 2006/07, which was only 2.5 percent annually over two years since the City last increased user charges. However, the City elected to not change user charges and hence the current user charges have been effective for four fiscal years. As a result, a larger user charge increase is now needed in this 2008 Study in the amount of 9 percent, but this is well below inflation over these four fiscal years. User charge systems are developed in subsequent chapters in order to recover these revenue requirements from wastewater customers according to the cost of providing various wastewater services to each type of customer tributary to the wastewater management facilities. Historical and

projected user charge revenue requirements are summarized on the following page first by type of sewer service and then by major cost category:

	Percent of User Charge Revenue Requirements											
Sewer Service	97/98	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09
Sanitary Sewer System	6%	5%	10%	7%	11%	14%	18%	15%	29%	17%	30%	18%
Source Control	3%	1%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Administration	20%	22%	19%	20%	22%	20%	17%	17%	13%	17%	16%	20%
Customer Accounting	1%	1%	2%	2%	1%	2%	2%	2%	2%	2%	2%	2%
Laboratory	5%	5%	4%	3%	3%	3%	3%	3%	2%	3%	3%	3%
Water Reclamation Plant	42%	45%	34%	44%	39%	36%	41%	44%	39%	43%	36%	39%
LAVWMA	22%	20%	28%	23%	22%	22%	17%	17%	13%	16%	12%	15%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

	Percent of User Charge Revenue Requirements											
Major Cost Category	97/98	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09
Personnel	40%	32%	29%	26%	28%	31%	32%	34%	27%	32%	26%	33%
Chemicals	8%	5%	4%	3%	3%	4%	2%	3%	2%	3%	3%	4%
Power	12%	13%	9%	8%	13%	11%	9%	8%	6%	7%	6%	8%
Sludge Disposal	4%	3%	2%	2%	2%	2%	2%	2%	1%	1%	1%	2%
Services & Supplies	15%	23%	25%	12%	14%	14%	12%	13%	10%	13%	12%	15%
Repairs & Maintenance	4%	6%	6%	3%	5%	4%	3%	4%	4%	3%	2%	3%
Administrative Charges	5%	5%	4%	10%	11%	11%	9%	10%	8%	10%	7%	9%
Debt Service	4%	3%	10%	12%	11%	10%	8%	8%	8%	9%	7%	8%
Capital & Replacements	8%	11%	11%	25%	13%	15%	22%	20%	36%	22%	36%	19%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

CHAPTER 4

COST OF SERVICE ANALYSIS

The purpose of cost-of-service study is to determine the cost incurred to serve each of the various customer classes. Costs of wastewater collection, treatment, and disposal together with associated billing and administration costs were projected in Chapter 3 for the defined study period. These costs can be related to certain wastewater treatment parameters. For the City of Livermore (City), these treatment parameters are peak month and annual discharges of flow, biochemical oxygen demand (BOD), and suspended solids (SS), and the number of connections to the system. Projections of customer wastewater characteristics for each of these treatment parameters were developed in Chapter 2 for the defined study period. The purpose of this chapter is to allocate projected wastewater user charge revenue requirements to the treatment parameters based on full cost-of-service philosophy.

User Charge Cost Allocations

Costs of sanitary sewer maintenance and costs of treating wastewater at the City's Water Reclamation Plant (WRP) are analyzed in this chapter. City costs of the Source Control Program that are analyzed in Chapter 6. Costs are recovered from City wastewater customers in accordance with the cost of providing wastewater services to each type of customer tributary to the wastewater system. Cost allocations to the treatment parameters and the concepts upon which these allocations are based are discussed and presented in the following subsections.

Sanitary Sewer Cost Allocations. The City's collection system consists of sanitary sewers that except for one small pump station rely upon gravity to get to the WRP. Cost allocations are summarized below:

Cost category	Allocation basis
Personnel services	Personnel costs are fixed and are, therefore, allocated to peak month flow.
Services & supplies	Costs of services and supplies are fixed and are, therefore, allocated to peak month flow.
Utilities	Electricity costs are variable and are allocated to annual volume.
Capital Outlays	Costs of capital outlays are fixed and are, therefore, allocated to peak month flow.
Replacement Reserves	Replacement reserve accruals are fixed and are, therefore, allocated to peak month flow.

Cost category	Allocation basis
Lateral Program	The City has a single-family residential surcharge of $1.05 monthly implemented on July 1, 2000 for lateral repairs. Funds of about $275,000 annually are generated, which offset a portion of the sanitary sewer costs allocated to single-family residential customers in Chapter 6 because they are funded via the surcharge assessed only these customers.

Source Control. The City's Source Control Program is described in Chapter 6 together with user charge design for the Source Control Program. In this Chapter 4, fifty percent of costs of the Source Control Program are allocated to general investigations not allocable specific customers. The remaining fifty percent of costs are analyzed in Chapter 6. Also, five percent of Laboratory costs are allocated to Source Control.

Water Reclamation Plant Cost Allocation. The City's Water Reclamation Plant is comprised of components that were constructed during five phases for an estimated historical cost of $58 million (Table 1, November 2005 Wastewater Connection Fee Study). Because the value of money has been decreasing over time, historical construction costs have no relationship with current construction costs, and thus historical costs can be misleading. In order to develop a meaningful wastewater treatment plant cost allocation, all construction costs must be stated in dollars of the same year so that equal weight is given to each plant component regardless of when it was installed. This is achieved through the use of the well-known Engineering News Record (ENR) Construction Cost Index (CCI) for the San Francisco metropolitan area. The historical cost of each component is multiplied by the ratio of the appropriate ENR CCI for the year of valuation to that year during which the component was installed. This process is illustrated below:

$$\text{Escalated cost} = \frac{\text{Historical cost x ENR CCI for current year}}{\text{ENR CCI for year of construction}}$$

The first step of the cost allocation process is to allocate the current replacement costs of the City's Water Reclamation Plant to the treatment parameters of flow, BOD, and SS. Individual components of the treatment plant are designed to handle flow, BOD, and/or SS. These components have different useful lives which cause certain ones to be replaced either before or after the composite useful life of the wastewater treatment plant has been reached. Because user class utilization of these individual components differ, it is necessary to consider their useful lives on an individual basis. Furthermore, because treatment plant expansion and improvement requires an investment of funds by the City, interest must be considered.

A method of allocation that allows for both of these considerations is based upon the annual capital recovery cost of treatment plant components. This cost is a theoretical value that approximates the sum of straight-line depreciation and the average annual interest cost of borrowed funds over the useful life of the project. It is computed by amortizing the capital

cost of each treatment plant component over its useful life using an interest rate based on current costs of borrowed funds or earned on investing City funds. The interest rate for the City for the defined study period is assumed to be 4 percent.

After the annual capital recovery amount of the current replacement cost of each component has been determined, it is allocated to the wastewater treatment parameters of flow, BOD, and SS. Allocations are made using cost-causative philosophy endorsed in 1973 by a joint committee report of the American Public Works Association, American Society of Civil Engineers, and the Water Pollution Control Federation. Cost-causative philosophy incorporates the concept that a treatment works, by its very nature, must include certain components to achieve a stated level of treatment for "normal" conditions. The costs of these components are primarily related to their size and complexity. Accordingly, to recover the costs of facilities in an equitable fashion, allocations to the treatment parameters are made on the basis of design criteria. If a specific component is installed or oversized because of abnormal sewage loadings that require special handling, the pro rata cost of these facilities are assessed to those users whose wastes cause the special design.

The November 2005 Wastewater Connection Fee Study prepared by this Consultant for the City shows an estimated replacement cost for 8.5-mgd of current design capacity to be $99 million. However, in order to perform a facility cost allocation, these costs must be segregated by major plant component, such as headworks, grit removal, pre-aeration and primary sedimentation tanks, secondary sedimentation, digestion, chlorination, anerobic digestion, odor control, waste activated sludge concentration, aeration, dissolved air flotation thickener, and so forth.

Except for the City's lack of a dedicated land disposal site for sludge, the plants are likely similar so the District's facility cost allocation percentages are used in this study. The respective original construction cost, current replacement cost, useful life, annual capital recovery cost, design criteria, and cost allocation for each significant component of the DSRSD wastewater treatment plant are presented in Table 15 which is shown on three pages in Appendix A of prior studies. Current cost allocation percentages for the treatment parameters used for the City's Water Reclamation Plant are summarized below from Table 15 of Appendix A of prior studies.

Treatment parameter	Allocation, percent
Flow	66.7
BOD	21.8
SS	11.5

Water Reclamation Plant Operating and Replacement Cost Allocations. City costs for the Water Reclamation Plant (WRP) include expenditures for the operation and maintenance of the WRP inclusive of replacements. Operation and maintenance expenses are either fixed (ongoing) or variable. Fixed costs are related to the wastewater treatment plant (or collection and disposal systems) and are, therefore, allocated using the wastewater treatment plant cost allocation percentages (or to peak month flow).

Variable costs, however, are incremental expenditures proportional to wastewater flows and loadings. Variable costs are, therefore, allocated to the treatment parameter(s) that cause the cost to be incurred. Because the levels of the various types of operation and maintenance expenses are influenced, to different degrees, by the various treatment parameters, each cost type is analyzed and allocated individually. Cost allocation concepts and cost allocations to the treatment parameters for the defined study period are summarized below:

Cost category	Allocation basis
Administration	Except for customer accounting, administration costs are a function of all other wastewater management costs and are allocated according to the total operating cost allocations exclusive of replacement reserve accruals and LAVWMA costs. Customer accounting costs are related to the number of bills and are allocated accordingly.
Laboratory	Laboratory costs are fixed as a function of the facilities constructed and regulatory requirements. Five percent of these costs are allocable to source control general analyses of sampling (BOD, SS, pH, etc.). The balance of laboratory costs is allocated according to the composite operating cost allocation for the WRP.
Operations	
Personnel services	All personnel costs are fixed because of the high degree of plant mechanization. Personnel costs are, therefore, allocated to the treatment parameters according to the WRP cost allocation percentages.
Services & supplies	Expenditures for services and supplies are fixed and are, therefore, allocated according to WRP the cost allocation percentages.
Utilities	Power costs are primarily variable and are allocated as follows: 25 percent to annual volume (pumping), 50 percent to annual BOD (aeration and sludge pumping, conditioning, dewatering, and storage), and 25 percent to annual SS (sludge).
Sludge & Grit Disposal	Costs of disposing sludge and grit are variable costs with sludge disposal costs equally allocated to annual BOD and SS and grit disposal costs allocated to annual SS.
Repairs & maintenance	Expenditures for repairs and maintenance are fixed and are, therefore, allocated according to the WRP cost allocation percentages

Cost category	Allocation basis
Chemicals	All chemical costs are variable and are allocated according to the dosage determinant. Ferric Chloride is used for setting solids and the dosage determinant is SS. Sodium Hypochlorite is used for disinfection and Caustic Soda is used for pH control. The dosage determinant for Sodium Hypochlorite and Caustic Soda is volume. Polymer is used for sludge and the dosage determinate is equally split between BOD and SS. Miscellaneous chemicals are primarily a function of volume and are allocated accordingly.
Replacements, debt & capital outlays	All replacement and capital outlay costs are fixed as a function of the treatment plant. These costs are, therefore, allocated according to the WRP cost allocation percentages
Operating reserves & Misc. income	Operating reserves and miscellaneous income are a function of all other costs except LAVWMA and are, therefore, allocated according to composite of the other cost allocations.
LAVWMA	LAVWMA debt service requirements, replacement reserve accruals, and fixed operation and maintenance costs are a function of peak month flow and are allocated accordingly. LAVWMA variable operation and maintenance costs are a function of annual volume and are allocated accordingly.

The allocation of fiscal year 2008/09 user charge revenue requirements to the treatment parameters is presented in Table 9. The treatment parameter cost allocation percentages are summarized below for this study and for last five studies:

Treatment parameter	2001 Study, percent	2002 Study, percent	2003 Study, percent	2004 Study, percent	2006 Study, percent	2008Study, percent
Peak Month						
Flow	61.0	60.2	58.6	64.4	62.6	63.4
BOD	10.9	9.2	9.3	9.5	9.0	9.2
SS	5.7	4.8	4.9	5.0	4.8	4.8
Connection	0.2	3.2	3.2	2.0	3.3	3.1
Annual Loadings						
Volume	8.0	9.1	10.6	8.1	9.2	9.0
BOD	7.5	6.8	6.7	5.2	5.3	5.1
SS	5.4	5.0	4.9	3.9	4.1	4.0
Source Control	1.3	1.6	1.8	1.9	1.7	1.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

As shown, 82 percent of costs are fixed as a function of the facilities constructed. The balance of costs of 18 percent is variable costs proportional to actual use and increases and decreases as customer use changes. This is a shift of 1 percent to fixed costs as compared a 2 percent shift to variable costs two years ago. This is because costs of electricity, chemicals and sludge hauling have stabilized after having been increasing more than other costs.

Table 9. Cost allocations To The Treatment Parameters For The City Of Livermore Wastewater Management Facilities

Cost category	Fiscal Year 2008/09	Cost Allocations To The Treatment Parameters							
		Annual Loadings			Peak Month Loadings				Source
		Volume	BOD	SS	Connection	Flow	BOD	SS	Control
Sanitary Sewer System									
Personnel Services	843,442					843,442			
Services & Supplies	525,345					525,345			
Utilities	2,851	2,851							
Capital Outlays	10,350					10,350			
Subtotal, Maintenance	1,381,989	2,851	0	0	0	1,379,138	0	0	0
Capital Improvement Program	0					0			
Replacement Reserves*	1,771,777					1,771,777			
Lateral Surcharges	(284,451)					(284,451)			
Total, Collection System	2,869,315	2,851	0	0	0	2,866,464	0	0	0
Source Control									
Personnel Services	291,327					110,826	36,200	19,030	125,270
Services & Supplies	76,186					28,983	9,467	4,977	32,760
Capital Outlays	0					0	0	0	0
Total, Source Control	367,513	0	0	0	0	139,809	45,667	24,007	158,031
Water Reclamation Plant									
Administration									
Personnel Services	515,192	45,840	26,391	20,853	15,907	327,085	48,948	24,680	7,488
Services & Supplies	1,098,539	97,744	56,273	44,465	33,918	697,441	100,107	52,625	15,967
Property Taxes In Lieu	641,700	57,096	32,871	25,974	19,813	407,403	58,476	30,740	9,327
Billing Design	0				0				
Customer Accounting	437,474				437,474				
Engineering/Landscape	82,800	1,521	1,203	944	292	57,022	12,468	6,554	2,796
Retiree Health Benefits	277,691	5,100	4,034	3,167	980	191,238	41,814	21,981	9,378
Administrative Surcharge	907,695	80,763	46,497	36,740	28,026	576,278	82,716	43,483	13,193
Subtotal, Administration	3,961,090	288,063	167,267	132,144	536,409	2,256,467	342,528	180,063	58,149
Laboratory									
Personnel Services	390,692	36,981	39,112	30,576	0	176,520	57,659	30,310	19,535
Services & Supplies	169,285	16,023	16,947	13,248	0	76,485	24,983	13,133	8,464
Capital Outlays	10,350	980	1,036	810	0	4,676	1,527	803	518
Subtotal, Laboratory	570,326	53,984	57,095	44,634	0	257,681	84,169	44,247	28,516
Operations									
Personnel Services	2,468,951					1,647,778	538,231	282,942	
Services & Supplies	729,232					486,690	158,973	83,570	
Utilities	869,047	217,262	434,523	217,262					
Sludge Disposal	264,200		132,100	132,100					
Grit Disposal	16,406			16,406					
Repairs & Maintenance	568,500					379,417	123,933	65,150	
Chemicals									
Ferric Chloride	59,415			59,415					
Sodium Hypochlorite	199,320	199,320							
Polymer	162,847		81,424	81,424					
Sodium Hydroxide	28,044	28,044							
Other Chemicals	168,104	168,104							
Capital Outlay	615,618					410,863	134,205	70,550	
Subtotal, Operations	6,149,685	612,730	648,047	506,606	0	2,924,748	955,342	502,212	0
Phase V Loan Payment	65,000					43,381	14,170	7,449	
Capital Improvement Program	0					0	0	0	
Replacement Reserves	658,223					439,298	143,493	75,432	
Operating Reserves	0	0	0	0	0	0	0	0	0
Replacement Transfers In	0	0	0	0	0	0	0	0	0
Ruby Hills, Other income, SC	(370,943)	(33,005)	(19,002)	(15,014)	(11,453)	(235,504)	(33,803)	(17,770)	(5,391)
Total, WRP	11,033,381	921,771	853,408	668,369	524,956	5,686,071	1,505,899	791,633	81,274
LAVWMA									
Debt Service	1,330,029					1,330,029			
Replacement Reserve Accruals	253,147					253,147			
Fixed O & M	457,276					457,276			
Variable O & M	588,484	588,484							
Total, LAVWMA	2,628,936	588,484	0	0	0	2,040,451	0	0	0
Total User Charge Requirements	16,899,145	1,513,107	853,408	668,369	524,956	10,732,795	1,551,566	815,640	239,304
Cost Allocation Percentages	100.0%	9.0%	5.1%	4.0%	3.1%	63.5%	9.2%	4.8%	1.4%

*Fixed cost Water Reclamation Plant allocations are based DSRSD's Facility Cost Allocation shown below:

Flow = 66.74% BOD = 21.80% SS = 11.46%

Revised 21-Feb-08

CHAPTER 5

USER CHARGE SYSTEM

The wastewater collection, treatment, and disposal systems are designed to serve the differing demands placed upon them by the various types of users tributary to the systems. To provide rate equity among users, it is necessary to allocate costs of accommodating these demands to users in proportion to the wastewater characteristics of each. This is accomplished by determining unit costs of service for each treatment parameter and multiplying the resultant values by each user's wastewater characteristics to yield user charges based on the cost of providing wastewater service. The purpose of this chapter is to develop a user charge system for the City of Livermore (City) that will recover adequate revenues in a fair and equitable manner for the defined study period, fiscal year 2008/09. Note that Source Control Program charges are developed in Chapter 6.

Types of Rates and Charges

Several types of charges can be included in a wastewater rate structure. Typically, these are:

- User charges
- Connection fees
- Standby charges
- Ad valorem taxes

The first three types are normally designed to recover system costs from users in proportion to the service rendered. Ad valorem taxes, on the other hand, seldom reflect the cost of service. These were traditionally used as a matter of convenience to recover system costs because it often did not require a new, separate billing system. However, as wastewater treatment costs have increased, significant inequities of tax systems have become apparent, and the trend is to place less reliance on this recovery method.

Connection fees are assessed latecomers to recover past outlays for debt service or other annual capital expense associated with plant capacity provided them but not recovered prior to connection. Conversely, standby charges are levied against intermittent and/or potential users prior to connection to recover the capital costs of capacity allocated for their use at the time expense is incurred.

Existing User Charge System

The City's existing user charge system is its third user charge system based entirely on cost-of-service, and it was implemented nearly four years ago on July 1, 2004 based on this Consultant's April 19, 2004 Study.

It is proposed herein that residential users continue to be assessed a flat monthly charge per dwelling unit by dwelling type. It is further proposed that commercial and institutional users continue to be assessed a rate per hundred cubic feet (Ccf) of metered water delivered which varies for the different customer classes according to the number of connections in each class, BOD and SS concentrations, and the percent of metered water delivered which is discharged to the sewer system. Lastly, it is proposed herein that industrial users and demand users continue to be assessed user charges monthly based on monitored wastewater discharged but that the rate structure be expanded to include demand charges in addition to loading charges. These same demand and loading user charge unit costs of service are used to calculated user charges for the other customer classes. These latter four types of users and some commercial users are also assessed charges for wastewater sampling and monitoring (i.e., Source Control user charges).

Regulatory Requirements

The City and LAVWMA have used federal and state grants to finance a portion of the costs of existing wastewater facilities. Acceptance of these grants places certain restrictions on the types and purposes of charges that can be included in a grantee's rate structure over the useful life of the grant funded facilities. The following are required by the federal act (PL 92-500) and regulations issued pursuant to the act:

1. **User Charges.** Costs of operation and maintenance must be recovered via user charges that are proportional to the cost of service provided recipients of wastewater service (PL 92-500, Section 204 (b) (1) (A)).

2. **Subscribing Agencies.** Subscribing agencies receiving wastewater services from regional wastewater systems are required to adopt U.S. Environmental Protection Agency (USEPA)-approved user charge systems (40 CFR 35.935-13 (b) (5)).

3. **Implementation.** A grantee must obtain approval of its user charge system before receiving Step 3 (construction) grant assistance (43 CFR 35.935-13 (b)).

4. **Adoption.** The user charge system must be adopted by municipal ordinance, resolution or other appropriate authority before the grant-funded facilities are placed into operation (43 CFR 35.935-13 (b)).

5. **Biennial Review.** The grantee must review user charges biennially and revise as necessary to recover all operation and maintenance costs according to the cost of providing wastewater service (40 CFR 35.935-13 (b) (1)).

In addition to the federal requirements, the State of California in the March 1998 Revenue Program Guidelines for Wastewater Agencies stipulates that a grantee or loan recipient must satisfy the following requirements:

1. **Regional Projects.** All costs of regional projects serving more than one agency must be distributed among the agencies or users of such agencies in proportion to use.

2. **Full Disclosure.** If all wastewater service costs are not recovered in proportion to system use, a statement describing the rate impact of such action must be included in the user charge system (i.e., revenue program). Such information must also be made public at a public hearing and in all notices required by public hearing notification procedure prescribed by laws governing the grantee.

3. **Replacement Funding.** User charges must recover replacement costs that include all capital expenditures except for major rehabilitations, structural rehabilitations, and expansions and upgrades required to meet future user demands. Replacement costs should be based on either a 5-year replacement plan or straight-line depreciation at current replacement costs.

4. **Changes in User Charges.** User charges shall be revised as necessary to reflect actual funding needs of the treatment plant. Any time user charges are changed, a copy of the work papers or study and the implementing ordinance or resolution shall be forwarded to the California Revenue Specialist for review and approval, and this is also applicable to joint-powers agreements for regional projects.

User Charge Assessment Recommendations

The recommended method of assessing user charges to each user class is discussed in the following subsections.

Residential. It is recommended that residential users continue to be billed a flat monthly rate by dwelling type, including single-family, condominium and multiple-family dwelling units. Different rates are established according to dwelling type in order to recognize that family sizes and thus, wastewater flows vary according to dwelling type. Billing and infiltration/inflow costs also vary according to dwelling type that further affects the rate differential. The flat rate billing method is inexpensive to administer, reasonably equitable, and provides a high level of revenue predictability. It also satisfies grant program regulations and is compatible with the existing billing system.

Commercial. It is recommended that users classified as commercial continue to be further categorized into seven user categories according to sewage strength. These classifications include automobile steam cleaning, bakeries, commercial laundries, grocery stores with garbage disposals, mortuaries, restaurants, and all other.

It is further recommended that all commercial users be billed according to either annualized winter metered water use or annual metered water usage. Rates based annual metered water usage automatically account for water that does not enter the sewer by customer class, e.g., irrigation. This is achieved by basing the annual volume of wastewater discharged (which is used to determine annual revenue requirements of each category) on the lesser of annual recorded water delivered or the average winter month's water usage (November through February or lowest four winter months) multiplied by 12 months. The annual revenue requirements of each category are then divided by the annual recorded water delivered to that category (the billing units) to obtain a user charge that automatically

accounts for water that does not enter the sewer. This user charge is expressed in dollars per Ccf of metered water usage and it is recommended that commercial users be assessed the charge monthly, subject to a minimum charge which is equal to the multiple-family residential user charge.

Industrial and Demand Users. It is recommended that user charges for industrial and demand users be divided into two parts: demand and loading. The demand charge recovers fixed costs associated with system capacity requirements imposed by the user, whereas the loading charge recovers variable costs allocable to handling the volume and load of sewage discharged. This additional detail is warranted because the wastewater characteristics of these users are unique and are not common to any group of users. These users must, therefore, be treated individually in order to achieve rate equity among the various types of users tributary to the system. It is important to note, however, that the user charge unit costs of service used to calculate demand and loading charges for these users are the same unit costs of service used to calculate user charges for the other customer classes tributary to the wastewater system.

Demand charges are based on the average day for the peak month loading (using normal working days) of each billing parameter for the user's capacity rights and are collected in monthly installments. When a user discharges less than its estimated demand, it is billed for the full amount for which capacity is reserved. Should the estimated demand be exceeded, the discharger is billed the demand unit rate multiplied by the new peak month discharge. This amount is assessed retroactively to the beginning of the fiscal year and for each month through the remainder of the fiscal year. The loading charge is computed and derived according to the recorded discharge for the billing period. If a user's wastewater strengths are relatively constant (such as domestic wastewater users), it is recommended that a unit rate per Ccf of wastewater discharged be established and assessed an industrial user throughout the rate period unless it has been determined that there has been a significant change in the user's operation which would materially affect sewage flows and strength. The recommended method of calculating a user charge together with a unit rate per Ccf of wastewater discharged are shown below.

User charge	Quantity	x Unit rate	Total charge
Peak month (demand)			
Flow	mgd	x $/mgd	= $_____
BOD	lb/day	x $/lb/day	= $_____
SS	lb/day	x $/lb/day	= $_____
Connection	Number	x $/conn.	= $_____
Annual (loading)			
Volume	mg	x $/mg	= $_____
BOD	1,000 lb	x $/M lb	= $_____
SS	1,000 lb	x $/M lb	= $_____
Total annual user charge			= $_____
Divide by annual wastewater discharged			= _____Ccf
User charge.....			= $____/Ccf

Institutional Users. It is recommended that institutional users be billed like commercial users according to annual metered water delivered, except that when winter month water use is annualized an adjustment must be made to reflect that schools do not usually discharge sewer for an entire year but mostly during the school year.

Method of User Charge Derivation

The proposed user charges will be based on the cost of service to provide plant capacity and to handle actual loadings discharged to the system. User charges are determined using a three-step process:

1. Unit costs of service are derived by dividing the annual cost allocated to each treatment parameter in Chapter 4 by the appropriate peak month or annual loadings estimated in Chapter 2.
2. Total annual cost-of-service revenue requirements are calculated for each user class by multiplying unit costs of service by the estimated loadings discharged.
3. Rates are established by dividing the annual revenue requirements assignable to each user class by the number of estimated billing units associated with each.

This process is used to determine user charges for City customers in the following subsections.

Unit Costs of Service. Annual user charge unit costs of service are determined by dividing the annual cost associated with each treatment parameter (Table 9) by the peak month and annual loadings (Table 7). The total costs to be recovered from each treatment parameter, the number of units upon which cost recovery is based, and the average annual user charge unit costs of service for fiscal year 2008/09 are presented in Table 10. As shown in Table 10, collection costs are segregated from all other costs to recognize that collection system costs are not assigned to infiltration/inflow.

The annual flow and volume user charge unit costs of service developed in Table 10 are multiplied by the peak month and annual infiltration/inflow (Table 7), respectively, to determine average annual infiltration/inflow costs for fiscal year 2008/09 based on infiltration /inflow projected in Chapter 2. Because infiltration/ inflow is primarily a function of the size of a collection system, and because the size of a collection system is primarily related to the number of connections to the system, annual infiltration/ inflow costs are divided by the number of connections to determine annual infiltration/inflow user charge unit costs of service. These calculations are developed at the bottom of Table 10 for fiscal year 2008/09. Similar calculations could be performed in Table 10 for unaccountable BOD and SS loadings. All customer BOD and SS loadings discharged to the treatment plant in fiscal year 2008/09 are thought to be accounted for because the City's customer base appears unlikely to generate the unaccountable BOD and SS identified in Chapter 2 of this study, nor the unaccountable BOD and SS estimated in the April 2006 Study, nor the unaccountable BOD estimated in the April 2004 Study and the March 2003 Study, nor accountable SS estimated in the March 2002 Study. If unaccountable BOD and/or SS identified in Chapter 2 had been carried forward to projections of customer wastewater characteristics for fiscal year 2008/09, then the costs of

Table 10. Annual User Charge Unit Costs Of Service For The City Of Livermore For Fiscal Year 2008/09

Treatment Parameter	Annual Cost, Dollars	Customer Wastewater Characteristics	Unit Costs Of Service, Dollars
Collection System			
Annual Loadings			
Volume, mg	2,851	2,712.67	1.05
Peak Month Loadings			
Flow, mgd	2,866,464	7.7604	369,371.34
Connection, each	0	26,336	0.00
Source Control	239,304		
Water Reclamation Plant			
Annual Loadings			
Volume, mg	921,771	2,712.67	339.80
BOD, M lb	853,408	5,898.89	144.67
SS, M lb	668,369	5,683.83	117.59
Peak Month Loadings			
Flow, mgd	5,825,880	7.7604	750,720.52
BOD, lb/day	1,551,566	17,076.00	90.86
SS, lb/day	815,640	16,412.71	49.70
Connection, each	524,956	26,336	19.93
LAVWMA			
Annual Volume, mg	588,484	2,712.67	216.94
Peak Month Flow, mgd	2,040,451	7.7604	262,931.74
Total, Net Costs	16,899,145	-	-
Infiltration/Inflow Allocations			
Collection	0	26,336	0.00
Water Reclamation Plant	0	26,336	0.00
LAVWMA	0	26,336	0.00
Total Infiltration/Inflow Costs	0	-	-

Table 11. Summary Of Total Annual User Charge Unit Costs Of Service For The City Of Livermore, Dollars

Treatment Parameter	Annual Unit Costs Of Service			
	Collection	Treatment	Disposal	Total
Annual Loadings				
Volume, mg	1.05	339.80	216.94	557.79
BOD, M lb	0.00	144.67	0.00	144.67
SS, M lb	0.00	117.59	0.00	117.59
Peak Month Loadings				
Flow, mgd	369,371.34	750,720.52	262,931.74	1,383,023.61
BOD, lb/day	0.00	90.86	0.00	90.86
SS, lb/day	0.00	49.70	0.00	49.70
Connection, each	0.00	19.93	0.00	19.93
Source Control				Chapter 6

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unaccountable BOD and SS loadings would have been allocated to the BOD and SS parameters to recognize that the unaccountable BOD and SS are most likely related to these parameters.

As shown in Table 10, costs of infiltration /inflow for fiscal year 2008/09 are estimated to be zero, as compared to $314,830 estimated in the April 2006 Study, zero estimated in the April 2005 Study, a negative $241,222 estimated in the March 2003 Study, a negative $395,580 estimated in the March 2002 Study, a negative $120,850 estimated in the April 2001 Study and $197,000 estimated in the April 2000 Study. The negative occurs because I/I estimates were lowered in some studies because of higher flows assigned residential users; the total then equaled that discharged to the WRP. Costs of I/I estimated in the April 2006 Study were only 2.0 percent of costs, and eight years ago, estimated I/I costs were only 1.7 percent of estimated total costs and it was noted then, and is noted now, that both the I/I and cost of I/I are unusually low. Note that the estimated cost of infiltration/inflow includes both fixed and variable cost of treatment and disposal. As discussed in Chapter 2, all of the unaccountable flows appear to be from infiltration/inflow. If there were unaccountable flows from a discharger (s), then the identification of this discharge would result in additional revenues that would result in relatively lower user charges for all other users. In addition, the sources of infiltration/inflow should also be investigated. If corrective measures to reduce I/I are cost-effective, then some of the I/I capacity may be able to accommodate growth in system use that would result in additional revenues and thus relatively lower user charges for existing users.

Average annual user charge unit costs of service for fiscal year 2008/09 are summarized from Table 10 in Table 11. The unit costs of service shown in Table 11 are used to calculate user charges for each user class. Note that all user classes are assessed identical user charge unit costs of service in accordance with full cost of service philosophy.

User Class Cost Allocations. Annual costs assignable to each user class are determined by multiplying the user charge unit costs of service shown in Table 11 by the wastewater characteristics of each user class projected in Table 7. These calculations are performed for each user class and are summarized in Table 12 for fiscal year 2008/09. Note that the City user charge revenue requirements shown in Table 12 are identical to those shown in Table 8 except for Source Control Program revenue requirements that are carried forward to Chapter 6. Further note that lateral repair surcharge revenue is used to offset a portion of collection system costs allocable to single-family residential customers because it is they that contribute this extra revenue.

User Charges. User charges are determined for each user class (except for industrial & demand users and septage haulers who are assessed user charges according to wastewater discharged) by dividing the annual costs assignable to each user class by the number of estimated billing units associated with each user class. This procedure is shown in Table 12 for fiscal year 2008/09. Note that all user charges are based on the estimated quantity and strength of wastewater discharged.

Table 12. Determination Of Monthly Revenue Requirements & User Charges By User Class For The City Of Livermore For FY 2008/09

Customer Class	Annual User Charge Revenue Requirements, Dollars				Billing Units		Monthly User Charge, Dollars			
	Collection	Treatment	Disposal	Total	Type	Quantity	Collection	Treatment	Disposal	Total
Residential										
Single-Family										
Lateral Surcharge Income	284,451			284,451	DU	22,575	1.05			1.05
User Charge Income	1,836,424	7,216,386	1,699,146	10,751,957	DU	22,575	6.78	26.64	6.27	39.69
Condominiums	130,980	529,818	121,189	781,986	DU	2,362	4.62	18.70	4.28	27.59
Multiple-Family	206,187	769,146	190,774	1,166,106	DU	4,289	4.01	14.94	3.71	22.65
Subtotal, Residential	2,458,042	8,515,350	2,011,108	12,984,500	DU	29,226	84.10	291.36	68.81	37.02
Commercial										
Automobile Steam Cleaning	249	2,079	222	2,550	Ccf	283	0.88	7.34	0.78	9.00
Bakeries	206	1,390	184	1,779	Ccf	239	0.86	5.81	0.77	7.43
Commercial Laundries	3,314	13,866	2,964	20,143	Ccf	3,815	0.87	3.63	0.78	5.28
Markets With Disposals	25,343	160,667	22,664	208,675	Ccf	29,783	0.85	5.39	0.76	7.01
Mortuaries	1,505	9,547	1,346	12,397	Ccf	1,768	0.85	5.40	0.76	7.01
Restaurants	53,510	352,185	47,853	453,548	Ccf	62,235	0.86	5.66	0.77	7.29
All Other	391,839	1,412,043	350,416	2,154,298	Ccf	539,098	0.73	2.62	0.65	4.00
Subtotal, Commercial	475,965	1,951,777	425,649	2,853,391	-	637,222	0.75	3.06	0.67	4.48
Institutional										
Schools & Churches	104,648	341,307	85,512	531,467	Ccf	194,679	0.54	1.75	0.44	2.73
All Other	6,630	23,702	5,929	36,261	Ccf	13,599	0.49	1.74	0.44	2.67
Subtotal, Institutional	111,278	365,010	91,440	567,728	-	208,278	0.53	1.75	0.44	2.73
Industrial										
LLNL	99,244	297,671	92,759	489,674	-	-	-	-	-	-
Other industrial	9,237	31,783	7,980	49,000						
Subtotal, industrial	108,481	329,454	100,738	538,673	-	-	-	-	-	-
Source Control				239,304	-	-	-	-	-	-
Total, User & Lateral Charges	3,153,765	11,161,590	2,628,936	17,183,595	-	-	-	-	-	-

Note: Industrial users are assessed user charges according to actual wastewater discharged, and Source Control User Charges are designed in Chapter 6.

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Proposed User Charges

Proposed monthly user charges by user class for fiscal year 2008/09 are presented in Table 13. It is recommended that residential users continue to be billed flat monthly rates according to dwelling type and that commercial and institutional users now be billed quantity rates. It is further recommended that industrial and demand users be billed according to actual wastewater discharged to the sewer system. Note that all user charges are based on identical user charge unit costs of service. Also note that all users are subject to a minimum monthly user charge equal to the multiple-family monthly user charge.

It is proposed that the City increase the single-family residential user charge by $2.00 from $37.70 to $39.70 monthly, as compared to $0.75 proposed but not implemented two years ago and the last two increases of $1.15 four years ago on July 1, 2004 and $1.00 the year before on July 1, 2003. These user charges are all exclusive of the lateral repair surcharge of $1.05 monthly with those repairs not typically done by the public agency but instead by the customer.

This 2008 Study finds the need to increase user charges by 5 percent which is allocable to four fiscal years and far less than inflation despite the need to continue increasing replacement reserves due to past depreciation not yet funded and to continue increasing operating reserves. The 2006 Study was the third study to find the need for a minimal and less than inflation user charge increase of only 2 percent and it was allocable to two fiscal years. However, the City elected to not implement that 2 percent increase. The 2003 Study was the first study to find the need for a minimal and less than inflation user charge increase of only 2.1 percent, and the 2004 Study proposed a user charge increase of only 2.8 percent. The March 2002 Study found the need for an 11 percent user charge increase for fiscal year 2002/03 that the City implemented last July 1, 2002. The fiscal year 2002/03 user charge increase was allocable 6 percent to a new administrative surcharge per a DMG Study, 2 percent to higher customer accounting costs, 1 percent to the need to amend the sewer service contract with LLNL, and 1 percent for operating reserves, and 1 percent for other cost increases.

Rate Impact of Changes in User Charge Design. A comparison of the existing user charges for fiscal years 2004/05 through 2007/08 and user charges proposed for fiscal year 2008/09 is presented in Table 14. The rate impact of the proposed user charges varies for the customer classes because of changes in use and costs. However, the rate impact variances in recent studies have been minimal in this study and studies since the 2003 Study as compared to earlier studies. In the 2006 Study, there were again minor relative increases in BOD and SS unit costs due to higher cost increases for electricity, chemicals and sludge disposal compared to other cost increases that caused very slight user charge increases for users with high BOD and SS concentrations. In this 2008 Study, the opposite occurs as electricity costs have stabilized in recent years. The single-family residential rate increase is proposed to be 5 percent or less than inflation when allocated over four fiscal years, and the average user charge increase is also proposed to be 5 percent. User charge revenues are estimated to increase by 5.7 percent due to the proposed increases in user charges and growth in system use.

Four years ago when the City last increased user charges, proposed user charges increased slightly for high-strength customers due to wastewater treatment plant operating

Table 13. Proposed User Charges For City Of Livermore For Fiscal Year 2008/09

User Class	Billing Units	Monthly User Charge, Dollars				With No Irrigation
		Sewers	Treatment	Disposal	Total	
Residential*						
Single-Family	DU	6.80	26.65	6.25	39.70	
Condominiums	DU	4.60	18.70	4.35	27.60	
Multiple-Family	DU	4.00	14.95	3.75	22.65	
Commercial**						
Automobile Steam Cleaning	Ccf	0.88	7.34	0.78	9.00	9.09
Bakeries	Ccf	0.86	5.81	0.77	7.43	7.66
Commercial Laundries	Ccf	0.87	3.63	0.78	5.28	5.39
Markets With Disposals	Ccf	0.85	5.39	0.76	7.01	7.30
Mortuaries	Ccf	0.85	5.40	0.76	7.01	7.30
Restaurants	Ccf	0.86	5.66	0.77	7.29	7.51
All Other	Ccf	0.73	2.62	0.65	4.00	4.87
Institutional**						
Schools & Churches	Ccf	0.54	1.75	0.44	2.73	4.87
All Other	Ccf	0.49	1.74	0.44	2.67	4.87
Industrial						
Annual Loadings						
Volume	mg	1.05	339.80	216.94	557.79	
BOD	M lb	0.00	144.67	0.00	144.67	
SS	M lb	0.00	117.59	0.00	117.59	
Peak Month Loadings						
Flow	mgd	30,780.95	62,560.04	21,910.98	115,251.97	
BOD	lb/day	0.00	7.57	0.00	7.57	
SS	lb/day	0.00	4.14	0.00	4.14	
Connection	each	0.00	1.66	0.00	1.66	

*Single-family surcharge for the City's lateral program is not included above.

**Commercial & institutional user charges are adjusted for irrigation by user class.

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Table 14. Comparison Of Existing & Proposed User Charges By Customer Class For The City Of Livermore

User Class	Billing Units	Monthly User Charge, Dollars								User Charge Increase, Percent			
		Existing, Fiscal Years 2004/05 - 2007/08				Proposed, Fiscal Year 2008/09							
		Collection	Treatment	Disposal	Total	Collection	Treatment	Disposal	Total	Collection	Treatment	Disposal	Total
Residential													
Single-Family	DU	8.15	22.70	6.85	37.70	6.80	26.65	6.25	39.70	-17%	17%	-9%	5%
Condominiums	DU	5.55	15.80	4.70	26.05	4.60	18.70	4.35	27.60	-17%	18%	-7%	6%
Multiple-Family	DU	4.80	12.90	4.10	21.80	4.00	14.95	3.75	22.65	-17%	16%	-9%	4%
Commercial													
Automobile Steam Cleaning	Ccf	1.04	6.91	0.84	8.80	0.88	7.34	0.78	9.00	-16%	6%	-7%	2%
Bakeries	Ccf	1.04	5.50	0.84	7.38	0.86	5.81	0.77	7.43	-18%	6%	-9%	1%
Commercial Laundries	Ccf	1.03	3.26	0.83	5.12	0.87	3.63	0.78	5.28	-16%	12%	-7%	3%
Markets With Disposals	Ccf	1.04	5.19	0.84	7.07	0.85	5.39	0.76	7.01	-19%	4%	-10%	-1%
Mortuaries	Ccf	1.04	5.19	0.84	7.08	0.85	5.40	0.76	7.01	-19%	4%	-10%	-1%
Restaurants	Ccf	1.03	5.34	0.83	7.21	0.86	5.66	0.77	7.29	-17%	6%	-8%	1%
All Other	Ccf	0.85	2.22	0.69	3.76	0.73	2.62	0.65	4.00	-15%	18%	-5%	6%
Institutional													
Schools & Churches	Ccf	0.65	1.53	0.47	2.65	0.54	1.75	0.44	2.73	-17%	14%	-6%	3%
All Other	Ccf	0.57	1.46	0.46	2.48	0.49	1.74	0.44	2.67	-14%	20%	-4%	8%
Industrial													
Annual Loadings													
Volume	mg	1.09	212.69	270.68	484.46	1.05	339.80	216.94	557.79	-3%	60%	-20%	15%
BOD	M lb	0.00	145.97	0.00	145.97	0.00	144.67	0.00	144.67		-1%		-1%
SS	M lb	0.00	112.37	0.00	112.37	0.00	117.59	0.00	117.59		5%		5%
Peak Month Loadings													
Flow	mgd	37,033.72	53,373.48	22,804.44	113,211.64	30,780.95	62,560.04	21,910.98	115,251.97	-17%	17%	-4%	2%
BOD	lb/day	0.00	7.70	0.00	7.70	0.00	7.57	0.00	7.57		-2%		-2%
SS	lb/day	0.00	4.30	0.00	4.30	0.00	4.14	0.00	4.14		-4%		-4%
Connection	each	0.00	1.02	0.00	1.02	0.00	1.66	0.00	1.66		62%		62%
Average industrial	Ccf	1.05	2.21	0.85	4.11	0.75	2.27	0.69	3.70	-29%	3%	-18%	-10%
Existing & Proposed Rates	Ccf	0.95	2.71	0.81	4.48	0.79	3.15	0.74	4.69	-17%	16%	-9%	5%

Single-family user charge has $1.05 for lateral repairs not included in the general user charge shown for FYs 2004/05 - 2007/08 anc $1.05 estimated for FY 2008/09.

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cost increases being less than for the sanitary sewer system and LAVWMA and BOD and SS unit costs decreased slightly. This also occurred in the prior two years but the year before high-strength users saw relatively larger user charge increases.

For the March 2002 Study, the single-family residential user charge increase was 12 percent. Proposed user charges for most other City customers increased by 11 percent, and proposed user charge increases for high-strength customers increased by only 2 to 9 percent due to wastewater treatment plant operating cost increases being less than for the sanitary sewer system and LAVWMA and BOD and SS unit costs decreased slightly.

For the April 2001 Study, the rate impact of the proposed user charges varied slightly for the customer classes with most seeing a user charge increase of 4 percent and high-strength users seeing user charge increases of 7 to 8 percent. This variance was entirely attributable to lower LAVWMA costs allocable entirely to flow and higher Water Reclamation Plant costs of which over one-third are allocable to BOD and SS.

For the April 2000, the rate impact of the proposed user charges varied significantly for the customer classes because there had been no changes in structure for many years. Current use characteristics are remarkably different than before 1990 with residential flows far lower than historical estimates. City user charge design until fiscal year 1999/2000 was for 280 gpd, but connection permits were and are issued with 220 gpd. Commercial and institutional allocations were also at 280 gpd but were set many years ago without analyses of water use characteristics. The City's then existing user charge system also had no demand charges which has the effect of requiring only residential customers to pay fixed costs for their capacity of 280 gpd for 365 days of the year. Cost allocations were also significantly different with a far greater proportion of costs allocable to flow due to increasing LAVWMA costs. The result was that last year the proposed single-family residential user charge increased by 20 percent even though user charge revenues increased by 32 percent. Nonresidential users saw significant user charge increases upon implementation of user charges based on cost-of-service on July 1, 2000. It was noted then that thereafter the rate impact variances will still differ but nothing like when first implementing user charges based on full cost-of-service philosophy.

It is important to note that comprehensive rate studies always find rate variances between the customer classes because use and cost characteristics are not constant but changing. All of the user charge unit costs of service increase and decrease by different amounts as a result of moderate changes in customer wastewater characteristics and the composition of costs. As the cost of service basis changes, the user charge unit costs of service change. This is why it is very important to periodically conduct a detailed cost of service study such as this study, as compared to arbitrarily increasing user charges and unit costs by a uniform percent that is essentially how the City had been setting user charges prior to first conducting this study. A detailed cost of service study ensures that all customers are assessed user charges according to the cost of providing various wastewater services for each type of customer tributary to the wastewater system.

User Charges of Other California Communities. Wastewater user charges of other California communities are shown in Table 15. As shown in Table 15, average monthly user charge for 35 northern California communities was estimated to be $30.50 for fiscal year 2006/07, the latest survey available. The average for Alameda County

Table 15. User Charges & Connection Fees Of Other California Communities

Agency	FY 2006/07 Survey Of 5-07		Escalated To FY 2008/09	
	Monthly User Charge, Dollars	Connection Fee, Dollars	Monthly User Charge, Dollars	Connection Fee, Dollars
Albany City of	37.79	1,998	40.50	2,100
American Canyon City of	33.60	14,523	36.00	15,600
Antioch City of	24.10	6,167	25.80	6,600
Benicia City of	41.33	7,500	44.30	8,000
Brentwood City of	18.90	4,881	20.20	5,200
Castro Valley S. D.	15.83	9,700	17.00	10,400
Central Costa County Sanitary District	23.33	4,150	25.00	4,400
Concord, City of	21.50	4,100	23.00	4,400
Crockett-Valano Sanitary District	39.42	2,425	42.20	2,600
Dublin San Ramon Services District	27.25	11,230	29.20	12,000
Fairfield-Suisun Sanitary District	20.81	5,943	22.30	6,400
Hayward City of	18.95	5,236	20.30	5,600
Hercules-Pinole WPCP	38.08	1,350	40.80	1,400
Morgan Hill City of	32.57	8,830	34.90	9,500
Napa Sanitation District	26.25	5,660	28.10	6,100
Novato Sanitary District	28.50	6,660	30.50	7,100
Oakland City of	33.80	1,631	36.20	1,700
Oakley (Iron House S.D.)	30.00	4,456	32.10	4,800
Oro Loma Sanitary District	16.08	7,261	17.20	7,800
Petaluma City of	49.34	3,500	52.90	3,700
Pleasanton City of	31.50	10,400	33.70	11,100
Rodeo Sanitary District	45.08	5,000	48.30	5,400
Rohnert Park City of	57.25	17,500	61.30	18,700
Sacramento City of	29.47	7,124	31.60	7,600
San Jose/Santa Clara WPCP	21.63	780	23.20	800
San Leandro City of	22.32	1,220	23.90	1,300
Santa Barbara City of	28.09	2,251	30.10	2,400
Santa Rosa, City of	63.00	10,500	67.50	11,200
San Mateo City of	32.51	2,081	34.80	2,200
Sunnyvale City of	22.10	2,879	23.70	3,100
Stege Sanitary District	26.79	2,298	28.70	2,500
Union Sanitary District	19.04	3,294	20.40	3,500
Vacaville City of	28.83	7,438	30.90	8,000
Vallejo Sanitation/Flood Control District	32.78	2,230	35.10	2,400
West Bay Sanitary District	30.00	3,003	32.10	3,200
Range of 35 northern California communities				
Low	15.83	1,220	17.00	1,300
High	63.00	17,500	67.50	18,700
Average	30.50	5,577	32.70	5,966
Range for Alameda County (14 reporting)				
Low	15.83	998	17.00	1,100
High	37.79	11,230	40.50	12,000
Average	27.92	5,076	29.90	5,400
Range for 753 California communities				
Low	0.00	0	0.00	0
High	231.92	22,305	248.40	23,900
Average	30.86	3,547	33.10	3,800
City of Livermore, Existing & Proposed	37.70	4,199	39.70	4,199
			Revised	21-Feb-08

was estimated to be $27.92, and the average for 753 California communities included in the survey was estimated to be $30.86. Current and proposed City residential rates are greater than the California average because of replacement financing being provided for on a pay-as-you-go basis and because of the extraordinary wastewater disposal costs of the Tri-Valley. LAVWMA costs are 15 percent of fiscal year 2008/09 funding, and City replacement reserve accruals instead of debt later are 15 percent of funding inclusive of LAVWMA replacement reserve accruals that are 1.4 percent of City funding. Though it is more common these days in California, two decades ago only four percent of wastewater utilities nationwide were accruing reserves for future replacements and few wastewater utilities have such significant disposal costs as in the Tri-Valley. Note that, like the City of Livermore, DSRSD, City of Pleasanton, LAVWMA and Zone 7 user charges all contain replacement reserve accruals.

Considering the significant disposal and replacement funding provided for in the City wastewater user charge system, the user charge system proposed for the City of Livermore compares favorably to others in California with the difference equal to the unique disposal requirements of the Livermore-Amador Valley. And considering the importance of wastewater and water management today in California, the proposed user charges are quite reasonable.

Source and Application of Funds. Source and application of funds statements for fiscal years 2007/08 and 2008/09 are presented in Table 16. As shown in Table 16, the proposed user charges will recover adequate revenues through June 30, 2009. However, it is projected that operating reserves will still be far less than the optimal level. Furthermore, replacement reserves will be minimal in view of past, unfunded depreciation and the fact that a single, major failure could easily require all reserves. However, the City will likely receive surplus funds from LAVWMA at the conclusion the Export Facilities Project that will finally bring operating reserves to a more healthy level. The City's operating reserve balance is improving but has been and still is well below where it ought to be. Minimal operating reserves for fiscal year 2008/09 are estimated at $6.7 million. However, it is estimated that the City will have $4.2 million of operating reserves by the end of the fiscal year, June 30, 2008. The City's Budgetary Operating Reserves are far greater at $8.0 million and hence the proposed user charges for fiscal year 2008/09 are not designed to increase operating reserves further though $530,000 is in the current fiscal year 2007/08 budget. The City also has replacement reserves of $13.1 million as of June 30, 2007 that are clearly inadequate though far improved from none nine years ago. However, replacement reserves should not be used to meet operating cash flow requirements because then these replacement funds may not be available for replacements and further are intended to earn interest income to contribute towards replacements. Accordingly, the City is continuing to budget to increase replacement reserves annually.

City Costs of Wastewater Services. City costs of wastewater services and components of the single-family residential user charge are summarized below. Note that each customer class participates differently in different wastewater services depending upon use characteristics. Accordingly, the single-family residential user charge proportions vary from funding proportions of different wastewater services. Further note that LAVWMA debt estimated at $3.15 monthly for fiscal year 2002/03 assumed that Series B debt would be issued. However, the LAVWMA Export Project to date has had lower construction costs and also lower debt interest expense than earlier planning estimates and hence Series B debt will

Table 16. Source & Application Of Funds For The City Of Livermore

Description	Fiscal Year, Dollars 2007/08	2008/09	Change, Percent
Source Of Funds			
User Charges			
Residential	12,005,450	12,700,049	5.8%
Commercial	2,704,616	2,853,391	5.5%
Institutional	546,132	567,728	4.0%
Industrial	524,186	538,673	2.8%
Source Control	232,877	244,694	5.1%
Ruby Hills	322,968	357,943	10.8%
Subtotal, User Charges	16,336,229	17,262,477	5.7%
Lateral Surcharges, Single-Family	282,848	284,451	0.6%
Miscellaneous Income	13,000	13,000	0.0%
Replacement Transfers In	4,544,400	0	
Operating Reserves	152,419	0	
Total Source Of Funds	21,328,896	17,559,928	-17.7%
Application Of Funds			
Operation & Maintenance			
Collection System	1,335,200	1,381,989	3.5%
Source Control	355,085	367,513	3.5%
Water Reclamation Plant	10,283,750	10,746,101	4.5%
LAVWMA	999,116	1,045,761	4.7%
Replacement Reserve Accruals & CIPs			
Collection System	5,111,243	1,771,777	-65.3%
Water Reclamation Plant	1,673,157	658,223	-60.7%
LAVWMA (includes Repair Debt)	1,571,345	1,583,175	0.8%
Operating Reserves	0	5,389	
Total Application Of Funds	21,328,896	17,559,928	-17.7%
*Operating reserves	4,203,581	4,208,970	0.1%

Budgetary Operating Reserves as of June 30, 2007 were $8,045,845 .

*Operating reserves as of June 30, 2007 were $4,356,000 .

Replacement reserves as of June 30, 2007 were $13,062,374 .

**Minimal operating reserves are estimated at $6,653,000 .

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not be needed. Accordingly, the user charge now required for LAVWMA debt is $3.10 for fiscal year 2008/09 and it increased from fiscal year 2004/05 because principal payments began on August 1, 2005 whereas payments until then have only been for interest. However, because annual debt service payments are now fixed, growth causes the user charge to decrease over time.

Type of Service	Current User Charge, 2004/05-07/08	Current Allocation	Proposed User Charge	Proposed Allocation, 2008/09
Collection	$8.15	22 %	$6.80	17 %
Treatment	$22.70	60 %	$26.65	67 %
Disposal	$6.85	18 %	$6.25	16 %
Total user charge	$37.70	100 %	$39.70	100 %
Funding Type				
Operations	$24.85	66 %	$30.85	78 %
Replacement/CIP	$9.85	26 %	$5.75	14 %
LAVWMA Debt	$3.00	8 %	$3.10	8 %
Total user charge	$37.70	100 %	$39.70	100 %

User Charge System Implementation and Administration

It is recommended that the user charges proposed for fiscal year 2008/09 be implemented by July 1, 2008. Because the proposed user charges will recover adequate revenues through June 30, 2009, and because federal grant program regulations attendant to the City's existing grant funded wastewater facilities require and state regulations recommend that the City to review user charges at least biennially, it is recommended the proposed user charge system be reviewed in one year and no later than two years, and adjusted as required to ensure revenue adequacy and rate equity.

Revenue Program Submittal to the SWRCB. After adoption, and if Livermore applies for state grants or loans, a copy of the user charge study should be submitted for SWRCB approval to the State Water Resources Control Board, Division of Water Quality, Revenue Program Unit, P.O. Box 944214, Sacramento, California, 94244-2120. Thereafter, user charges must be revised as necessary to reflect actual funding needs of the treatment plant. Any time user charges and/or joint-powers agreements are changed, a copy of the work papers or study and the implementing ordinance or resolution must be forwarded to the California Revenue Specialist for review and approval.

CHAPTER 6

SOURCE CONTROL PROGRAM USER CHARGE SYSTEM

The City of Livermore (City) has a Source Control Program as required by State Water Resources Control Board and U.S. Environmental Protection Agency wastewater management regulations. The Source Control Program serves to control discharges of contaminants from commercial and industrial sources. If not controlled, such discharges can cause operational and/or performance problems at the City's Water Reclamation Plant (WRP) which would result in higher costs for all City wastewater customers.

Current Source Control User Charge System

The costs of the Source Control Program are recovered via user charges assessed to City customers that are included in the program. The City's current user charge system is based on the April 2004 Study and consists of permit fees, inspection and document reviews at an hourly rate, a fee for composite sampling with general analyses, a fee for grab sampling with general analyses, and fees for special analyses by commercial laboratory at cost plus fifteen percent.

Proposed User Charge System Structure. No changes are proposed for the City's Source Control use charge system except for minimal increases. It is proposed that Source Control Program customers continue to be assessed flat monthly service charges in addition to charges for sampling and analyses. These monthly service charges are for users sampled four times monthly, once monthly, quarterly, and annually. Variable charges for wastewater sampling analyses are proposed to continue to include a charge for a composite sample with general analyses and a charge for a grab sample with general analyses. Charges for special analyses are at cost plus an administrative charge of fifteen percent. Variable charges to users vary according to the number and type of analyses conducted during the billing period. Furthermore, there are charges proposed herein for permitting, inspections and enforcement hearings.

It is proposed that significant users continue to be sampled routinely, four times monthly for demand users and once monthly for categorical users. An exception to this sampling schedule is a significant user that has a batch or zero discharge status for which the sampling schedule will be determined on a case-by-case basis. Intermediate users will continue to be segregated as being routinely sampled either quarterly or annually. Flat, monthly service charges would recover program administration costs and would be based on the number of routine samples to be performed for each user class.

It is further proposed that the general sampling charge be continue to be segregated as being for either a composite sample or a grab sample with the composite sample requiring 2.5 times the resources as a grab sample. The general sample charge would continue to be for analyses of BOD, COD, SS, and pH. Finally, it is proposed that annual grease trap inspections for restaurants and automotive service establishments continue to be treated as one grab

sample. It is recommended that associated costs of grease trap inspections be absorbed by the WRP until such time that it is practical to bill directly to the customer. It probably may not administratively practical to bill for each grease trap inspection that is priced next fiscal year at $166.15 and the program will benefit the collection and treatment systems by preventing grease from entering the system and thus reduce associated costs. Accordingly, it is recommended that associated costs be funded via general user charge revenues. However, if a follow-up inspection is required, it is recommended that a charge be assessed to the user as a penalty and to recover the costs of the follow-up inspection.

It is recommended that the Source Control Program user charge system assess the WRP for costs of analyses performed for the WRP that are not allocable to any individual user. These analyses may include certain routine analyses required by the NPDS permit as well as analyses undertaken if operational problems occur. When operational problems occur which require special analyses, every effort is made to identify the source of the problem and the user is assessed charges for the investigation. However, such users are not always identified and thus costs are incurred by the treatment plant. Because Source Control Program users are related to the Source Control Program costs incurred by the treatment plant and because such Source Control Program costs benefit all users tributary to the WRP, it is recommended that these costs be funded via the general user charge system.

Customer Use Characteristics

Current Source Control Program use characteristics were supplied by City staff and are presented in Table 17. As shown in Table 17, seventy-five wastewater customers are currently included in the Source Control Program, as compared to eighty-five wastewater customers two years ago, and various types of wastewater analyses are conducted.

Note that the WRP and Sanitary Sewers are each treated as customers according to the frequency of sampling over a year. Also note that it is estimated that a composite sample requires 2.5 times the program resources as a grab sample. Finally, each sampling charge covers either general analyses done by the City's Laboratory or transmitting the sample to a commercial laboratory for special analyses with the commercial laboratory charges being an additional charge to the customer. Over time, the number of users, analyses, and types of analyses will change as a result of growth in system use, change in regulatory requirements, and an expanded wastewater sampling database. However, it is not known what changes will occur between now and June 30, 2009 and thus it is assumed that the use characteristics shown in Table 17 will be applicable over fiscal year 2008/09.

User Charge Revenue Requirements

Annual revenue requirements for the Source Control Program were analyzed in Chapter 3 of this study. Sixty percent of Source Control resources were allocated to the WRP, and five percent Laboratory resources were allocated to the Source Control Program. There were also composite allocations for administrative expense, operating reserves and miscellaneous income. Source Control Program user charge revenue requirements for fiscal year 2008/09 are estimated to be $245,000.

Table 17. Source Control Program Customer Use characteristics

Customer Use Characteristics	Annual Amount				Weighting Factor	Adjusted Amount
	Customers	WRP	Sewers	Total		
Users						
Significant						
Weekly Sampling (4 Times Monthly)	2	0	0	2	48	96
Monthly Sampling or Self-Monitoring	1	0	0	1	12	12
Quarterly Sampling or Self-Monitoring	8	0	0	8	4	32
Intermediate						
Quarterly Sampling or Self-Monitoring	3	0	0	3	4	12
Annual Sampling or Self-Monitoring	61	0	0	61	1	61
Total, Users	75	0	0	75		213
Analyses						
General-BOD, COD, SS, & pH						
Composite	67	0	0	67	2.5	168
Grab	67	0	0	67	1.0	67
Subtotal, General Analyses	134	0	0	134		235
Special Analyses						
Composite						
Metals	117	0	0	117	2.5	293
Mercury	105	0	0	105	2.5	263
Grab						
EPA 624/601	101	0	0	101	1.0	101
EPA 625/602	101	0	0	101	1.0	101
Cyanide	101	0	0	101	1.0	101
Subtotal, Special Analyses	525	0	0	525		858
Total, Analyses	659	0	0	659		1,093

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Source Control Program Cost Allocations

Costs of the Source Control Program can be related to certain parameters on which charges can be based. For the City, these parameters include administration of the Source Control Program, fixed sampling costs, and variable sampling costs that include costs of various wastewater analyses. Administration and fixed sampling costs are a function of the Source Control Program. Fixed costs include expenditures for personnel, miscellaneous sampling equipment, conferences, uniforms and safety clothing, publications, capital cost recovery for equipment, and costs of replacing equipment. Variable costs, however, are incremental expenditures proportional to the number and type of wastewater sampling analyses conducted. Variable costs are, therefore, allocated to the type of analyses that causes the cost to be incurred. Variable costs include expenditures for City and commercial laboratory services. In order to perform an equitable allocation of Source Control Program costs, each cost category must be analyzed and allocated individually. The cost allocations used in this study are summarized below. Note that fixed costs are segregated between major users and intermediate users according to the number of samples to be conducted for each user class annually.

Cost category	Allocation basis
Personnel Services	Costs of personnel services are fixed as a function of the Source Control Program. Costs are further allocated 24 % to administration and 76 % to sampling.
Services & Supplies	Costs of services and supplies are fixed as a function of the Source Control Program. Costs are further allocated 24 % to administration and 76 % to sampling.
Capital Outlay	Costs of capital outlays are fixed as a function of the Source Control Program. Costs are further allocated 24 % to administration and 76 % to sampling.
WRP Laboratory Services	Costs of WRP Laboratory services are variable and are a function of number of general analyses performed for BOD, SS, pH, grease and oil. Costs are allocated to variable sampling.
Administration operation & maintenance and capital cost allocation.	Costs of administration are a function of all other operation and maintenance expenses and are allocated according to the composite
Replacement Reserves	Costs of replacement reserves are fixed as a function of the Source Control Program. Costs are further allocated 24 percent to administration and 76 percent to sampling.
Permit Fees	Permit fee revenue is allocable to fixed administrative costs because those resources generate this revenue.

Cost category	Allocation basis
Operating reserves	Operating reserves are a function of all other O & M and capital costs and are, therefore, allocated according to the composite Source Control Program cost allocation.
Miscellaneous revenue	Miscellaneous revenue is a function of all other O & M and capital costs and is, therefore, allocated according to the composite Source Control Program cost allocation.

The allocation of Source Control Program costs to the billable parameters is presented in Table 18 for fiscal year 2008/09. As shown in Table 18, 24 percent of Source Control Program costs are allocated to administration and the balance of 76 percent are allocated to sampling and laboratory analyses. Eighty-four percent of the costs are fixed as a function of the program. The balance of sixteen percent of costs is variable and is a function of the number and type of analyses performed.

Source Control Program User Charges

User charges for the City's Source Control Program are calculated in this section. These charges are calculated using the same methodology that was utilized to develop general user charges for City wastewater customers.

Unit Costs of Service. The determination of Source Control Program unit costs of service is presented in Table 19. These unit costs are calculated by dividing the average annual projected cost of each billable parameter (Table 18) by the use associated with each parameter (Table 17). Note the hourly rate calculation with that being the basis to design charges for special tasks.

Determination of User Charges. User charges are calculated for each user class and wastewater analysis in Table 20. As shown in Table 20, identical unit costs of service are used for each parameter. For example, the administrative unit cost of $169.73 is used to calculate annual flat, service charges for each customer class. The sampling unit cost of $174.51 is the basis for calculating both composite and grab samples for both routine and violation follow-up sampling. Note that violation follow-up charges are twice routine charges to encourage compliance and because the sampling is not routine. Finally, the hourly unit cost of $58.85 is used to calculate charges for special tasks based on the average estimated hours shown in Table 20 for each such task.

Proposed User Charges. Monthly user charges proposed for the Source Control Program for fiscal year 2008/09 are presented in Table 21. Also shown in Table 21 are existing user charges and the rate impact of implementing the proposed user charges. The impact of proposed source control user charges is 5 percent that is allocable to four fiscal years or similar to inflation. However, the current and proposed source control user charges are less than those assessed in the western valley. For example, the weekly sampling service charge of $678.95 monthly proposed for Livermore is well less than the $1,067.50 assessed

Table 18. Source Control Program Cost Allocations, Dollars

Cost Category	Fiscal Year 2008/09	Program Admini-stration	Wastewater Sampling Analyses				
			Analyses		Special Analyses		
			Fixed	Variable	WRP	Sewers	Customers
Personnel services	125,270	30,065	95,206	0	0	0	0
Services & supplies	32,760	7,862	24,898	0	0	0	0
Capital Outlay	0	0	0	0	0	0	0
WRP Laboratory	28,516	0	0	28,516	0	0	0
WRP Administration	58,149	11,822	37,438	8,889	0	0	0
Replacement reserves	0	0	0	0	0	0	0
Permit fees	(12,500)	(12,500)	0	0	0	0	0
Operating reserves	0	0	0	0	0	0	0
Miscellaneous income	(5,391)	(1,096)	(3,471)	(824)	0	0	0
Cost allocations	226,804	36,154	154,070	36,581	0	0	0
Allocations percents	100%	16%	68%	16%	0%	0%	0%

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Table 19. Determination Of Source Control Program Unit Costs Of Service

Parameter	FY 2008/09 Costs, Dollars	Use Parameter	Unit Costs Of Service, $
Administration, Adjusted			
Annual Amount	36,154	213	169.73
Sampling			
General Analyses, Adjusted Units			
Fixed	154,070	1,093	141.02
Variable	36,581	1,093	33.48
Special Analyses*			
WRP	0	0	
Sewers	0	0	
Customer	0	525	
Total Costs	226,804		
Hourly Labor Rate For Special Tasks**			58.85

*Special analyses by commercial laboratory are charged directly.

**Personnel salary & benefit costs for 2.75 staff divided by 1,800 hours annually.

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Table 20. Determination Of Source Control Program User Charges

Customer Use Characteristics	Unit Cost, Dollars	Weighting Factor	Amount, Dollars
Users			
Significant			
Weekly Sampling (4 Times Monthly)	169.73	48.0	8,147.28
Monthly Sampling or Self-Monitoring	169.73	12.0	2,036.82
Quarterly Sampling or Self-Monitoring	169.73	4.0	678.94
Intermediate			
Quarterly Sampling or Self-Monitoring	169.73	4.0	678.94
Annual Sampling or Self-Monitoring	169.73	1.0	169.73
Analyses			
General-BOD, COD, SS, pH, Grease & Oil			
Composite	174.51	2.5	436.27
Grab	174.51	1.0	174.51
Special Analyses			
Composite	174.51	2.5	436.27
Grab	174.51	1.0	174.51
Violation Follow-Up			
Composite	174.51	5.0	872.54
Grab	174.51	2.0	349.02
Permits, Inspections & Hearings			
New Permits			
Review Application & Inspection			
Significant Users	58.85	16.0	941.60
Intermediate Users	58.85	8.0	470.80
Permit Issuance			
Significant Users	58.85	3.0	176.55
Intermediate Users	58.85	1.5	88.28
Renewal Of Permits			
Review Application & Inspection			
Significant Users	58.85	8.0	470.80
Intermediate Users	58.85	4.0	235.40
Permit Issuance			
Significant Users	58.85	2.0	117.70
Intermediate Users	58.85	1.0	58.85
Permit Amendment			
Significant Users	58.85	1.0	58.85
Intermediate Users	58.85	0.5	29.43
Routine Or Compliance Inspection			
Significant Users	58.85	3.0	176.55
Intermediate Users	58.85	2.0	117.70
Show Cause Hearing*	88.28	6.0	529.65
Enforcement Hearing*	88.28	8.0	706.20

*Rates for hearings are increased 50 % for management attendance.

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Table 21. Proposed & Existing Source Control Program User Charges

Customer Use Characteristics	Monthly User Charges, Dollars		Change, Percent
	Existing FY 06/07 & 07/08	Proposed FY 2008/09	
Users			
Significant			
Weekly Sampling (4 Times Monthly)	641.05	678.95	6%
Monthly Sampling or Self-Monitoring	160.25	169.75	6%
Quarterly Sampling or Self-Monitoring	53.40	56.60	6%
Intermediate			
Quarterly Sampling or Self-Monitoring	53.40	56.60	6%
Annual Sampling or Self-Monitoring	13.35	14.15	6%
Analyses			
General-BOD, COD, SS, pH, Grease & Oil			
Composite	413.85	436.25	5%
Grab	165.55	174.50	5%
Special Analyses			
Composite	413.85	436.25	5%
Grab	165.55	174.50	5%
Commercial laboratory	Cost + 15 %	Cost + 15 %	0%
Violation Follow-Up			
Composite	827.70	872.55	5%
Grab	331.10	349.00	5%
Permits, Inspections & Hearings			
New Permits			
Review Application & Inspection			
Significant Users	855.00	942.00	10%
Intermediate Users	428.00	471.00	10%
Permit Issuance			
Significant Users	160.00	177.00	11%
Intermediate Users	80.00	88.00	10%
Renewal Of Permits			
Review Application & Inspection			
Significant Users	428.00	471.00	10%
Intermediate Users	214.00	235.00	10%
Permit Issuance			
Significant Users	107.00	118.00	10%
Intermediate Users	53.00	59.00	11%
Permit Amendment			
Significant Users	53.00	59.00	11%
Intermediate Users	27.00	29.00	7%
Routine Or Compliance Inspection			
Significant Users	160.00	180.00	13%
Intermediate Users	110.00	120.00	9%
Show Cause Hearing*	480.00	530.00	10%
Enforcement Hearing*	640.00	710.00	11%

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by Pleasanton and DSRSD. The composite sampling charge of $436.25 proposed for Livermore is less than $515.00 assessed in the western valley. Accordingly, source control user charges proposed for Livermore very reasonable.

Source and Application of Funds. A source and application of funds statement for the Source Control Program is presented in Table 22 for fiscal years 2007/08 and 2008/09. As shown in Table 22, increasing source control user charges by as proposed will recover adequate revenues to operate the program on an enterprise basis (i.e., be self-sufficient).

Recommendations

It is recommended that the City increase Source Control Program user charges for fiscal year 2008/09. Source Control Program user charges should be reviewed and revised again in one year to ensure that the Source Control Program is operated on a sound, enterprise basis and becomes self-sufficient from other wastewater operations. In the meantime, City staff should continue to monitor revenues and expenses of the program to ensure that these goals are met. Because the Source Control Program is relatively small, slight changes in use characteristics and/or expenses can have a dramatic affect on the financial integrity of the Source Control Program.

Table 22. Source and Application of Funds Statement
For The Source Control Program, Dollars

Description	Fiscal Year 2007/08	Fiscal Year 2008/09	Change Percent
Source of Funds			
Customers			
Monthly User Charges	34,129	36,161	6%
Sampling User Charges	180,856	190,641	5%
Subtotal, Customer User Charges	214,985	226,802	5%
Water Reclamation Plant			
Monthly User Charges	0	0	
Sampling User Charges	0	0	
Subtotal, WRP	0	0	
Sanitary Sewers			
Monthly User Charges	0	0	
Sampling User Charges	0	0	
Subtotal, Sanitary Sewers	0	0	
Permit Fees & Miscellaneous	17,891	17,891	0%
Total Revenue	232,877	244,694	5%
Operating Reserves	(3,544)	0	
Total Source Of Funds	229,333	244,694	7%
Application Of Funds			
Operation & Maintenance	152,687	158,031	3%
WRP Laboratory Services	27,552	28,516	3%
Administration	56,182	58,149	3%
Replacement Accruals	0	0	
Operating Reserves	0	(2)	
Application Of Funds	236,421	244,694	3%

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