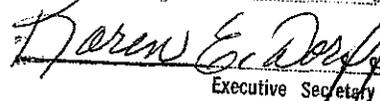
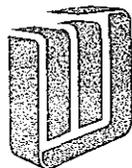


JUL 14 1992


Executive Secretary**MWD**

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

June 30, 1992

To: Board of Directors (Water Problems Committee--Information)
 Board of Directors (Finance & Insurance Committee--Information)

From: General Manager

Subject: Revenue Design Study

Report

Transmitted herewith is the Revenue Design Study Report prepared by Black & Veatch in association with Price Waterhouse; Fieldman, Rolapp & Associates; Recht Hausrath & Associates; O'Melveny & Myers; and E. W. Moon. This report presents the results of the study of revenues, water rate structures, and related policies for Metropolitan.

The study responds to the need to review Metropolitan's revenue and rate policies which coincided with legislation (AB 1794) introduced by State Assemblywoman Gwen Moore. The legislation in its present form requires Metropolitan to conduct a study to investigate water supply and demand management strategies which will result in reliable water supplies at reasonable costs, consistent with the State's goals for environmental protection. In addition to the issues in the legislation, the study addresses financial conditions brought on by the drought and the on-going capital improvement program.

The study is divided into nine areas:

- Background
- Water Management Programs
- Water Demand and Supply
- Revenue Sources
- Capital Financing
- Revenue Program
- Alternative Rate Structures
- Equity Considerations
- Budgeting Practices

The study evaluates Metropolitan's financial and water management policies. This includes a review of existing reports, studies and other documentation and the identification of revenue and rate alternatives. A questionnaire was developed and mailed to each member of the Board of Directors and to the manager of each member agency to gain perspective on the issues of concern to the respondents. A summary of the responses is included in the study. Although this information was useful in defining issues to be investigated, it did not influence the results of the study.

The background section of the study presents a description of Metropolitan's rate and revenue history, a description of water management programs, and a discussion of the impact of water management programs. The study recommends that the objective of each of Metropolitan's water management programs be reevaluated and the success of each of the programs in achieving their individual objectives be analyzed before any future adjustments to program incentives are recommended.

In the water demand and supply portion, data on Metropolitan's water sales to its member agencies were collected and reviewed to evaluate the variability of Metropolitan's water demands. Models used by Metropolitan in forecasting future demands were also reviewed and evaluated. The study found that Metropolitan uses a "state of the art" approach for forecasting normal demands. To enhance the existing models, it is recommended that the use of a probability matrix be incorporated into the development of future supply and demand level estimates.

The third section of the study addresses a number of revenue issues and evaluates alternative revenue sources available to Metropolitan. Existing and potential revenue sources were evaluated based on equity, revenue stability, implementation, administration, consistency with Metropolitan's policies, conservation impact, and legal challenge considerations. Recommendations include focusing on revenue stability through increased revenue diversity, rate structuring, and prudent use of working capital. It is recommended that Metropolitan explore policies that would require new development to pay for the cost of growth-induced new facilities. The study recommends that the District secure legal authority to implement a connection charge to be levied on new development, and develop the methodology for setting the charge and the mechanism to collect the charge.

Capital financing needs and available sources of funding are reviewed in the fourth section. Scenarios were developed to accommodate Metropolitan's capital improvement program (CIP). Projected future annual debt service costs were also developed using a mix of debt instruments. Recommendations related to capital financing include obtaining a formal legal determination that the issuance of certificates of participation is not subject to revenue bond debt/equity limitations, considering formal adoption of a long term Capital Improvement Plan, investigating shortening the maturities on some future debt issues, and exploring the use of surety policies in place of fully funded debt service reserve funds.

The revenue portion of the study examines existing programs, financial plans, and projections to focus attention on specific areas where benefits may be realized. It is recommended that Metropolitan increase the level of integration of its financial planning models to cover at least a ten-year time frame, link capital improvement program planning to financing and rate requirements, and consider an additional ten-year planning horizon if significant CIP requirements extend past ten years. It is also recommended that the working capital reserve be based on a probability of a 500,000 acre-foot shortfall in sales supplemented by adequate emergency reserves.

Several alternative rate structures for Metropolitan are examined in the study including tiered, uniform volume, demand, marginal cost pricing, and life-line based rates. Each alternative was evaluated based on its applicability, potential for legal challenge, equity, consistency with Metropolitan's policies, implementation and administrative issues, customer acceptance, revenue stability, and conservation impact. Recommendations for alternative rate structures include implementing a rate form which recognizes both the volume of water purchased and the peak demand placed on the District's delivery system by member agencies. Before this could be accomplished, alternative approaches to implementing such a rate form need to be evaluated; and a detailed cost allocation study must be performed to determine appropriate, phased in, cost based commodity-demand rate structures. Depending upon the methodology of setting and charging such rates, it is the consultant's position that it may be possible to phase out seasonal storage rates such that member agencies could then develop long-term capital programs which include appropriate storage in response to Metropolitan's demand based rates.

The study identifies alternative accounting methods, under generally accepted accounting principles, which might enhance Metropolitan's balance sheet equity position. The procedures that were reviewed included conservation expense capitalization, amortization, off-balance sheet financing, borrowing restrictions, land sales, and replacement cost accounting. It is recommended that Metropolitan reevaluate its policy for amortizing on-aqueduct costs of the State Water Project to ensure the appropriateness of the current method. Additionally, surplus land and real estate assets should be categorized such that assets of lesser or marginal use and importance may be considered for sale, lease, or other alternative use. The sale of land is viewed as one apparent opportunity for enhancing the District's balance sheet equity position.

The budget portion of the study analyzes the appropriateness and effectiveness of the District's budgeting policies to examine the relationship between the capital construction program, water demand forecasting, and development of budget and revenue requirements. Recommendations include preparing a formal ten-year financial plan which would include both operating expenditures and capital projects for Board approval. This document would serve as the key planning document for the evaluation of capital projects, including realistic estimates of down-stream operating costs associated with capital projects.

The study provides an objective framework from which staff can develop an action plan to address the District's revenue structure. Part of the action plan will involve the preparation of additional analyses of the alternatives presented in the study prior to recommending to the Board any changes in Metropolitan's existing policies. As part of this process, input from the member agencies will be solicited regarding changes in water rates and other forms of revenue.

The proposed legislation called for the study to be submitted to the California Legislature and Metropolitan's Board of Directors on or before June 30, 1992. It should be noted that AB 1794 was introduced in March 1991 as a two-year bill and, to date, has not been approved by the Legislature. Since this report has been submitted to your Board, it is now a public document and a copy has been provided to Assemblywoman Moore. Copies will also be provided to other interested parties.

Board Committee Assignments

This letter was referred to:

The Finance and Insurance Committee pursuant to its authority to determine revenues to be obtained through sales of water under Administrative Code Section 2441(e).

The Water Problems Committee pursuant to its authority to determine the selling prices of water under Administrative Code Section 2481(c).

Recommendation

For information only.


Carl Boronkay

MCF:jg
007MCF

REVENUE DESIGN STUDY REPORT



METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

BLACK & VEATCH

in association with

**Price Waterhouse
Fieldman, Rolapp & Associates
Recht Hausrath & Associates
O'Melveny & Myers
E. W. Moon**

1992

REVENUE DESIGN STUDY REPORT



METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

BLACK & VEATCH

in association with

**Price Waterhouse
Fieldman, Rolapp & Associates
Recht Hausrath & Associates
O'Melveny & Myers
E. W. Moon**

CONTENTS

INTRODUCTION	I-1
STUDY BACKGROUND	I-1
SCOPE	I-1
LIST OF DATA	I-2
QUESTIONNAIRE	I-2
 SUMMARY OF FINDINGS AND RECOMMENDATIONS	 S-1
BACKGROUND	S-1
Findings	S-1
Recommendations	S-2
WATER DEMAND AND SUPPLY	S-3
Findings	S-3
Recommendations	S-4
REVENUE SOURCES	S-5
Findings	S-5
Recommendations	S-7
CAPITAL FINANCING	S-9
Findings	S-9
Recommendations	S-11
REVENUE PROGRAM	S-11
Findings	S-11
Recommendations	S-13
ALTERNATIVE RATE STRUCTURES	S-13
Findings	S-14
Recommendations	S-15
EQUITY CONSIDERATIONS	S-16
Findings	S-16
Recommendations	S-17
BUDGETING	S-18
Findings	S-18
Recommendations	S-19
 BACKGROUND	 1
RATE AND REVENUE HISTORY	1
Overview	1
Current Wholesale Water Rate Structure	6
Classes of Service	6
Noninterruptible Water Service	6
Interruptible Water Service	6
Emergency Water Service	6
Seasonal Water Service	6
Reclaimed Water	6
WATER MANAGEMENT PROGRAMS	8
Interruptible Water Service Program of 1981	8
Local Projects Program of 1981	9
Water Conservation Credits Program of 1988	10
Seasonal Storage Program of 1989	10
Incremental Interruption and Conservation Plan of 1991	11
Groundwater Recovery Program of 1991	12
IMPACT OF WATER MANAGEMENT PROGRAMS	13
INFLATION ADJUSTED COST OF WATER	14

WATER DEMAND AND SUPPLY	15
OBJECTIVE AND PURPOSE	15
DATA SOURCES	15
CHARACTERIZATION OF METROPOLITAN'S DEMANDS AND SUPPLIES	15
Characterization of Demands on Metropolitan	15
Characterization of Metropolitan's Supplies	17
The Colorado River	17
State Water Project Supplies	17
CURRENT FORECASTING APPROACH	18
"Municipal and Industrial Water Use in the Metropolitan Water District Service Area; Interim Report No. 4"	18
"Agricultural Water Use in Metropolitan Service Area". Report No. 1018	19
"The Regional Urban Water Management Plan for the Metropolitan Water District of Southern California"	20
"Statistical Analysis of Water Demands During the Current Drought" (1989) by Thomas Chestnutt and Casey McSpadden	22
EVALUATION OF CURRENT FORECASTING METHODS	22
"Municipal and Industrial Water Use in the Metropolitan Water District Service Area; Interim Report No. 4"	22
"Agricultural Water Use in Metropolitan Service Area". Report No. 1018	23
"The Regional Urban Water Management Plan for the Metropolitan Water District of Southern California"	23
"Statistical Analysis of Water Demands During the Current Drought" (1989) by Thomas Chestnutt and Casey McSpadden	24
METROPOLITAN'S DEMAND VARIABILITY	24
Evaluation of Historical Deliveries	24
Factors Limiting Metropolitan's Water Sales	26
Prediction of Future Sales	26
Prediction of Limits on Imported Supplies	28
Prediction of State Water Project Supplies	28
Prediction of Colorado River Supplies	29
RECOMMENDATIONS	30
Use of a Probability Matrix for Estimation of Future Supply and Demand Levels	30
The Use of a Mass Diagram Approach to Sizing a Working Capital Reserve Fund	30
Preliminary Sizing of the Working Capital Reserve Fund	32
REVENUE SOURCES	35
REVENUE ISSUES	35
Fixed and Variable Revenue	35
Revenue Stability	36
Revenue Stability	39
Implementation	39
Administration	39
Consistency with Metropolitan Policy	39
Conservation Impact	39
Legal Challenge	40
Evaluation	41
Equity	41
Stability	41

Implementation	41
Administration	41
Consistency with Metropolitan Policy	41
Conservation Impact	41
Legal Challenge	41
ANNEXATION CHARGES	41
Evaluation	42
Equity	42
Stability	42
Implementation	42
Administration	42
Consistency with Metropolitan Policy	42
Conservation Impact	42
Legal Challenge	42
STANDBY CHARGES	42
Evaluation	43
Equity	43
Stability	43
Implementation and Administration	43
Consistency with Metropolitan Policy	43
Conservation Impact	43
Legal Challenge	43
SERVICE CHARGES	43
Evaluation	43
Equity	43
Stability	44
Administration	44
Implementation	44
Legal Challenge	44
CONNECTION CHARGES	44
Buy-in Charges	45
Impact Fees	45
Revenue Projection	45
Evaluation	46
Equity	46
Acceptability	46
Revenue Stability	46
Ease of Administration	46
Implementation of a Connection Charge	47
Documentation	47
Means of Collection	47
SUMMARY OF ALTERNATIVES	48
RECOMMENDATIONS	48
CAPITAL FINANCING	51
CURRENT DEBT STRUCTURE	51
Short Term Debt	51
Long Term Debt	51
CAPITAL FUNDING GUIDELINES	52
Legislative Guidelines	52
Metropolitan Policies	52
FUTURE CAPITAL REQUIREMENTS	53
Capital Improvement Plan through 2010	53
ALTERNATIVE FINANCING MECHANISMS	53
General Obligation Bonds	53

Revenue Bonds	54
Certificates of Participation	54
Dedicated Connection Charges	56
Joint Powers Authority	56
FINANCING ISSUES	56
Reserve Funds	56
Rate Covenants	57
Competitive vs. Negotiated Sale	57
Surety	58
Revenue Stability	59
Commercial Paper Program	59
Shelf Registration	59
Long Term Financial Planning	59
Hedging Instruments	60
FINANCING PLAN	60
Sensitivity Analysis	67
RECOMMENDATIONS	68
REVENUE PROGRAM	69
APPROACH TO REVENUE PROGRAM DEVELOPMENT	69
Seasonal Storage	70
RATES WITH SEASONAL STORAGE	73
Alternative Scenarios	79
RATES WITHOUT SEASONAL STORAGE	79
ACTIONS WHICH COULD REDUCE RATE INCREASES	100
Connection Charges	100
Standby and Service Charges	100
Water Management Programs	100
RECOMMENDATIONS	100
ALTERNATIVE RATE STRUCTURES	102
COST BASIS FOR RATES	102
TIERED RATES	103
Application to Metropolitan	104
Legal Challenge	104
Equity	104
Consistency with Metropolitan Policy	105
Implementation and Administration	105
Customer Acceptance	105
Revenue Stability	105
Conservation Impact	106
UNIFORM VOLUME RATE	106
Legal Challenge	106
Equity	106
Consistency with Metropolitan Policy	106
Implementation and Administration	106
Revenue Stability	107
Conservation Impact	107
DEMAND RATES	107
Application to Metropolitan	108
Legal Challenge	108
Equity	108
Consistency with Metropolitan Policy	109
Implementation and Administration	109
Customer Acceptance	109

Revenue Stability	109
Conservation Impact	110
MARGINAL COST PRICING	110
Application to Metropolitan	112
Equity	113
Consistency with Metropolitan Policy	113
Implementation and Administration	114
Customer Acceptance	114
Revenue Stability	114
Conservation	114
LIFE-LINE RATES	114
Applicability to Metropolitan	115
SUMMARY	115
RECOMMENDATIONS	115
EQUITY CONSIDERATIONS	117
CONSERVATION EXPENSE CAPITALIZATION	117
AMORTIZATION	118
State Water Project	118
Imperial Irrigation Project/Santa Margarita Project	118
OFF-BALANCE SHEET FINANCING	119
BORROWING RESTRICTION	120
LAND SALES	120
REPLACEMENT COST ACCOUNTING	122
SUMMARY	122
BUDGETING	123
INTRODUCTION	123
METHODOLOGY	123
CURRENT BUDGET PROCESS	124
EVALUATION OF BUDGET PROCESS	128
RECOMMENDATIONS	129

LIST OF TABLES

Table 1	Ten-Year Summary of Revenues by Source - Accrual Basis	2
Table 2	Total Water Demand & Water Sales Revenue	3
Table 3	Ten-Year Summary of Water Rates	7
Table 4	The Incremental Interruption and Conservation Plan	12
Table 5	Comparison of Actual Demands vs Projected Demands	33
Table 6	Evaluation of Alternative Revenue Sources	49
Table 7	Debt Service Analysis Assumptions and Projection of Construction Expenditures	61
Table 7	Debt Service Analysis Assumptions and Projection of Construction Expenditures (continued)	62
Table 8	Proposed Debt Service Issuance	63
Table 8	Proposed Debt Service Issuance (continued)	64
Table 9	Projected PAYGO & Debt Service Expenditures	65
Table 10	Proposed Debt Service Expenditures	65
Table 9	Projected PAYGO & Debt Service Expenditures (continued)	66
Table 10	Proposed Debt Service Expenditures (continued)	66
Table 11	Results of Sensitivity Analysis	67
Table 12	Projected Revenue Requirements	71
Table 12	Projected Revenue Requirements (continued)	72

Table 13	Current and Projected Water Rates with Seasonal Storage without Rate Stabilization	74
Table 13	Current and Projected Water Rates with Seasonal Storage without Rate Stabilization (continued)	
Table 14	Current and Projected Water Rates with Seasonal Storage Alternative A	76
Table 14	Current and Projected Water Rates with Seasonal Storage Alternative A (continued)	77
Table 15	Current and Projected Water Rates with Seasonal Storage Alternative B	80
Table 15	Current and Projected Water Rates with Seasonal Storage Alternative B (continued)	81
Table 16	Current and Projected Water Rates Alternative C	82
Table 16	Current and Projected Water Rates Alternative C (continued)	83
Table 17	Current and Projected Water Rates Alternative D	84
Table 17	Current and Projected Water Rates Alternative D (continued)	85
Table 18	Current and Projected Water Rates without Seasonal Storage without Rate Stabilization	87
Table 18	Current and Projected Water Rates without Seasonal Storage without Rate Stabilization (continued)	88
Table 19	Current and Projected Water Rates Alternative A	89
Table 19	Current and Projected Water Rates Alternative A (continued)	90
Table 20	Current and Projected Water Rates Alternative B	91
Table 20	Current and Projected Water Rates Alternative B (continued)	92
Table 21	Current and Projected Water Rates Alternative C	93
Table 21	Current and Projected Water Rates Alternative C (continued)	94
Table 22	Current and Projected Water Rates Alternative D (continued)	96
Table 23	Inverted Rate Structure Fiscal Year 1992-93	104
Table 24	Demand-Commodity Rate Structure Fiscal Year 1992-93	108
Table 25	Fixed and Variable Revenue under Commodity-Demand Rates	111
Table 26	Evaluation of Alternative Water Rate Structures	116
Table 27	Summary of Debt/Equity Information for Selected Utilities	121

LIST OF FIGURES

Figure 1	Fiscal Year Deliveries & Revenue	4
Figure 2	Unit Water Sales Revenue	5
Figure 3	Historical Deliveries - Total Deliveries to All Member Agencies	25
Figure 4	Annual Rainfall vs Annual Deliveries	27
Figure 5	Example Mass Diagram for Working Capital Reserve Fund	31
Figure 6	Prediction of Demands - Years 1969-1991	34

Figure 7	Projected Water Rates with Seasonal Storage	78
Figure 8	Alternative Water Rates with Seasonal Storage	86
Figure 9	Projected Water Rates without Seasonal Storage	97
Figure 10	Alternative Water Rates without Seasonal Storage	98
Figure 11	Seasonal Storage Program Impact	99
Figure 12	Key Budget Milestones	125
APPENDIX A	AB 1794	A-1
APPENDIX B	References	B-1
APPENDIX C	Summary of Questionnaire Responses	C-1

INTRODUCTION

On January 28, 1992, the General Manager of the Metropolitan Water District of Southern California (Metropolitan) informed the Board of Directors that acting on behalf of Metropolitan he had retained a team headed by Black & Veatch to conduct a revenue design study. The Black & Veatch team included Price Waterhouse, Fieldman Rolapp & Associates, Recht Hausrath & Associates, E. W. Moon, and O'Melveny & Meyers. The study team was asked to investigate five principal areas:

- Alternative Revenue Sources and Alternative Rate Structures
- Water Demand and Supply Projection Procedures
- Financing Alternatives
- Equity Considerations
- Budgeting Practices

This report presents the results of the study of revenues, water rate structures, and related policies for Metropolitan.

STUDY BACKGROUND

Three factors have combined to create the need for an independent review of Metropolitan's revenue sources and rate structures. During five years of drought, Metropolitan initially experienced significant increases in total revenues due to increased sales. When supply limitations were imposed, revenues decreased sharply. This has occurred while the costs of providing water service have continued to increase. Metropolitan has utilized monies from its Rate Stabilization Fund to offset its recent revenue shortfalls. Metropolitan is also faced with the need to undertake a number of major capital projects to meet future service requirements as well as to comply with new water quality and environmental regulations. In 1991, State Assemblywoman Gwen Moore introduced legislation (AB 1794) which requires Metropolitan to conduct a study to investigate water demand and management strategies to ensure reliable supplies at reasonable costs, consistent with the State's goals for environmental protection. A copy of AB 1794 is included in Appendix A. This study responds to the financial challenges associated with the drought, Metropolitan's capital projects program, and AB 1794.

SCOPE

The scope of the study was limited to an evaluation of Metropolitan's policies, a review of existing documents, and the identification of revenue and rate alternatives. The time constraints imposed on the study prevented performance of detailed analyses of the various alternatives identified. The analyses performed have not included consideration of potential impacts on users and member agencies of any of

the alternatives discussed. It is recommended that Metropolitan conduct further analyses, as appropriate, to implement the recommendations contained in this report.

LIST OF DATA

Metropolitan made considerable data available to the study team for its use in performing the study. The data provided includes reports, memoranda, charts, and miscellaneous data. A complete list of the data provided is shown in Appendix B.

QUESTIONNAIRE

To solicit input for the study and to provide guidance to the study team, a questionnaire was developed and mailed to each member of the Board of Directors and to the manager of each member agency. The questionnaire consisted of ten questions regarding revenue sources and rate structures. In addition to the written questionnaire, twelve Board members were interviewed on study issues.

A summary of Board and agency manager responses is presented in Appendix C. The responses were not used directly in conducting the study, but were used to gain perspective on the issues of concern to the respondents. Although this information was useful in defining issues to be investigated, it did not influence the results of the study.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

A summary of the main findings and recommendations from each section of the report follows.

BACKGROUND

This section presents a description of rate and revenue history for Metropolitan, a description of water management programs, and a discussion of the impact of water management programs. Metropolitan provides both treated and untreated water to its member agencies.

Findings

- (1) Metropolitan currently receives revenues from the sales of untreated and treated water, sales of electricity, ad valorem taxes, and other miscellaneous sources. Table 1 shows revenues by source for fiscal years 1982 through 1991.
- (2) Revenues from water sales have increased over time moving Metropolitan from taxed based financing to sales based financing. Revenues from water sales currently represent 69 percent of Metropolitan's total revenues. Table 2 presents a history of water sales and revenue from fiscal year 1970-71 to 1990-91.
- (3) Metropolitan's wholesale water rates are differentiated by treated and untreated and by class of service, but not by location or time of service. Table 3 presents a summary of water rates in effect from 1982 through 1991. Classes of service include noninterruptible water service, interruptible water service, emergency water service, seasonal water service, and reclaimed water.
- (4) The Interruptible Water Service Program was adopted by the Board in 1981. Under this program, Metropolitan provides imported water to its member agencies at discounted rates for local storage. The stored water is to be used when there is a temporary deficiency in imported supplies. All agricultural deliveries are indicated to be sold as interruptible service. The interruptible rate was suspended effective April 1, 1991.
- (5) The Local Projects Program was created in 1981 to stimulate reclamation activity in Metropolitan's service area. The program has been modified twice since its inception. Under the current Local Projects Program, financial incentives to the local agency arise from both direct payments from Metropolitan based on a commodity based formula and from the reduction in the amount of imported water that must be purchased from Metropolitan at the normal wholesale rate. The current payment is \$154 per acre-foot.
- (6) The Conservation Credits Program, approved by the Metropolitan Board in 1988, was patterned after the Local Projects Program. Under the program,

agencies receive a financial payment for implementing a conservation program based on the amount of water expected to be saved. In June 1990, Metropolitan set the Conservation Credits payment to \$154 per acre-foot.

- (7) The Seasonal Storage Program, adopted in 1989, provides an incentive for member agencies to purchase imported water between October 1 and April 30 for local storage. The current seasonal rates are \$130 per acre-foot for untreated water and \$154 per acre-foot for treated water. During the 1990-91 fiscal year approximately 16 percent of all Metropolitan deliveries were under the Seasonal Storage Program.
- (8) In 1990 Metropolitan and member agencies developed the Incremental Interruption and Conservation Plan. Under the plan, each agency is assigned a monthly conservation target of water. The plan is illustrated in Table 4. Under various stages of the plan, disincentive charges are applied to agencies exceeding their target quantity of deliveries. The program initially provided incentives if water usage was below conservation targets. That portion of the program was discontinued because of its cost.
- (9) In 1991 Metropolitan adopted the Groundwater Recovery Program (GRP). The program is modelled after the LPP and provides up to \$250 for recovery and treatment of contaminated groundwater.
- (10) From 1987 through 1991, the average annual revenue Metropolitan received from an acre-foot of water declined 10 percent while water rates remained unchanged. By 2000, Metropolitan's water management programs are estimated to cost over \$100 million annually, excluding the seasonal storage program.
- (11) The average price of water adjusted for inflation is presented graphically in Figure 2. Metropolitan's average revenue in 1991 is only about \$15 per acre-foot more than in 1971, showing that water has remained a low cost commodity.

Recommendations

- (1) The objective of each of Metropolitan's water management programs should be reevaluated.
- (2) The success of each of Metropolitan's water management programs in achieving their individual objectives should be analyzed.
- (3) Incentives from any of Metropolitan's water management programs should not be increased until after a reevaluation is completed. The long term impact on water rates of any increases in incentives should be part of such evaluations.

- (4) The potential use of dedicated funding sources should be investigated for each of Metropolitan's water management programs.
- (5) The level of incentives provided under Metropolitan's water management programs may need to be decreased as water rates increase to levels at which the alternative programs the incentives are designed to assist become economically feasible on their own.

WATER DEMAND AND SUPPLY

In this portion of the study, data on Metropolitan's water sales to its member agencies was collected and reviewed to evaluate the variability of Metropolitan water demands. Models used by Metropolitan in forecasting future demands were also reviewed and evaluated as well.

Findings

- (1) Metropolitan supplies treated and untreated water directly to 27 member agencies, meeting, on average, 55 percent of the water supply needs of its service area.
- (2) Metropolitan has water delivery contracts for Colorado River water with the U.S. Department of the Interior for 1,212,000 acre-feet per year (AFY) and an additional 180,000 AFY of surplus water. However, the 1964 U.S. Supreme Court decision in Arizona vs. California, along with current use by owners of perfected water rights predating Metropolitan's rights and conveyance losses along the Colorado River Aqueduct reduce the dependable supply to 510,000 AFY. An agreement with the Imperial Irrigation District allows for diversion of an additional 106,110 AFY.
- (3) Metropolitan has contracts with the State Water Project for the delivery of 2,010,000 AFY. However, the State Water Project is currently able to provide a dependable supply equal to about one-half of the amount the state is contracted to deliver.
- (4) Metropolitan has selected 1980 as the base year for forecasting total service area demands with its MWD-MAIN model. Calendar year 1980 was chosen for the base year because it is the most recent year for which all required disaggregate socioeconomic data is available.
- (5) In the year 2010, only 7 percent of the total regional use is expected to be for agriculture which represents only 5 percent of Metropolitan's deliveries. This compares to 10 percent of total regional use at the present time and 10 percent of Metropolitan's deliveries.
- (6) Metropolitan expects that conservation will increase from a rate of 7.4 percent in 1990 to a rate of 11.4 percent of total municipal and industrial demands in

the year 2010. However, these savings are expected to be offset by increases in water use due to demographic changes.

- (7) Historical monthly deliveries by Metropolitan to member agencies for the period of July 1981 through January 1992 are shown on Figure 3. The strongest long term relationship between deliveries and explanatory factors appears to be that between total monthly rainfall measured at Los Angeles Civic Center and the total deliveries. This relationship is shown on Figure 4.
- (8) Metropolitan uses a "state of the art" approach for forecasting normal demands. However, demands on Metropolitan are heavily influenced by weather patterns and the availability of future local and imported supplies which are difficult to accurately predict.
- (9) Prediction of future supply levels is complex. Supplies cannot be reasonably predicted other than on a probabilistic basis. In predicting future supplies from the State Water Project, the effects of the various proposed changes to the system must be incorporated. The supply situation for the Colorado River is more easily predicted. The system has many large reservoirs which allow for the balancing out of short term effects. Metropolitan can forecast Colorado River reservoir system operations using its 24 month reservoir operations planning model. For long term projections, it should be possible to establish relationships between flow levels and their probability of occurrence.
- (10) An analysis of water sales data from 1969 to 1991 presented in Table 5 indicates that the largest one year shortfall in sales from a level predicted by modeling was 335,455 acre-feet. The largest cumulative shortfall in sales covered a five year period and exceeded 700,000 acre-feet. The largest cumulative excess in sales also covered a five-year period and also exceeded 700,000 acre-feet.

Recommendations

- (1) A probability matrix should be used for estimation of future supply and demand levels. Such a system involves assigning probabilities of success to a certain outcome for each year under consideration and then multiplying this matrix of probabilities by the possible outcomes (increases or decreases in supplies) to obtain a weighted or expected supply.
- (2) A mass diagram approach could be used to size a component of the Working Capital Reserve Fund designed to mitigate the effects of supply or demand deficiencies. An example of such a diagram is presented on Figure 5.
- (3) Based on historical information, a reasonable estimate of the size of a Working Capital Reserve would be based on a shortfall in sales of 500,000 acre-feet. That amount is between the one year and five year maximum predicted in Table 5.

REVENUE SOURCES

This portion of the study examined a number of revenue issues and evaluated alternative revenue sources available to Metropolitan. Sources evaluated include water rates, property taxes, annexation charges, standby charges, service charges, and connection charges. Each source was evaluated based on equity, revenue stability, implementation, administration, consistency with Metropolitan policy, conservation impact, and legal challenge considerations.

Findings

- (1) Metropolitan should anticipate its ability to collect revenue from fixed sources, such as taxes and standby charges, to be diminished in the future. However, reliance upon fixed revenue sources is not the only means available to gain revenue stability. Revenue diversity, water pricing, and maintenance of adequate reserves are other methods of achieving revenue stability.
- (2) Section 5202 of Metropolitan's Administrative Code currently requires a balance of \$130 million to be held as working capital in the Revenue Remainder Fund. The amount is scheduled to increase to \$175 million for fiscal year 1992-93. This fund provides financial resources to meet emergencies and revenue shortfalls.
- (3) The Water Rate Stabilization Fund and Water Treatment Surcharge Stabilization Fund were established in 1987 and 1988 respectively to reduce future water revenue requirements and mitigate required increases in the rate surcharge for treated water. As of July 1, 1990 the combined balance in the Funds was approximately \$312 million. It is anticipated that the Funds will have zero balances by June 30, 1994.
- (4) Section 5109 of Metropolitan's Administrative Code indicates that the objective of the Board is to fund 20 percent of the cost of capital projects on a pay-as-you-go (PAYGO) basis. The stated purpose of PAYGO is to preserve debt capacity. Use of dedicated revenues to fund PAYGO would remove this highly variable revenue requirement from the annual rate setting process.
- (5) Water rates are Metropolitan's primary source of revenue and can be increased at any time with Board approval. Water rates are an equitable means of recovering cost of service. However, the potential for variation in annual water purchases by member agencies makes this revenue source unstable. The degree of instability can be mitigated through implementation of an appropriate rate structure and maintenance of adequate reserves. Most forms of water rates would be relatively simple for Metropolitan to implement and administer, and could be formulated consistent with Metropolitan policy. Water rates can be structured to encourage conservation, but their utility is reduced at the wholesale level. No legal challenges would be anticipated for conventional water rates.

- (6) The most stable form of revenue available to a governmental entity is ad valorem taxes. Section 124.5 of the MWD Act limits total tax revenues, other than from special annexation taxes, to the amount needed to pay outstanding general obligation bond debt of Metropolitan and Metropolitan's obligation to the State Water Project. Under existing legislation, taxes will cease to be levied when the general obligation bonds of Metropolitan and the State Water Project are fully paid by 2024. Raising tax revenues in excess of the limits set forth in the MWD Act is difficult. Property taxes do not recognize the level of service actually provided by Metropolitan within each member agency. Because taxes are based on property value and not water usage, they are not as equitable a method of collecting revenue for water service as water rates. The stability, ease of implementation, and administration of such revenues are well demonstrated. Tax revenues have no direct relationship with water use and therefore do not influence conservation efforts. At current levels, no legal challenge to use of taxes is anticipated.
- (7) Annexation charges represent a small portion of annual revenues for Metropolitan. Annexation charges are an equitable approach to bring new areas into Metropolitan on an equal standing with those in the original service area. Because annexations are limited, the stability of such revenues is limited. Annexation charges are a current revenue source for Metropolitan and are therefore clear of implementation, administrative, and policy issues. Annexation charges do not affect water conservation and are not likely to be subject to legal challenge.
- (8) On May 12, 1992 Metropolitan adopted a \$5.00 per parcel standby charge. The charge is expected to generate approximately \$25 million in annual revenue. Standby charges are independent of water usage and thus constitute a source of fixed revenue. They are developed under the rationale that developed and undeveloped parcels benefit, directly or indirectly, from available system capacity. A standby charge is generally considered equitable since it is usually a low fee and all property benefits from the availability of a water system. Inequity exists only in the case of properties which have little or no development potential. Implementation costs of such a charge are estimated at 7 percent of the first year's revenues, while administration of the charge will require considerable ongoing effort. Standby charges are authorized under the MWD Act and thus are consistent with current policy. The charges, however, do not encourage conservation. As a new revenue source they could be subject to legal challenge.
- (9) Service charges, authorized under the MWD Act, can be based on such factors as historical water usage, projected demands, acreage, property parcels, population, assessed valuation, or any combination thereof. Metropolitan adopted a service charge designed to collect \$25 million for fiscal year 1992-93 on May 12, 1992, based on the average of the last four years of water usage by each member agency. Service charges based on water usage, like water rates, are generally equitable. The main advantage of a service charge is its stability

as a fixed source of revenue. The administration of a service charge should be relatively simple. Implementing the charge may be difficult for some member agencies. Some may find it difficult to integrate into their current rate structures. Because the service charge is strictly authorized in the MWD Act and because it is levied only on member agencies, no adverse legal action is anticipated.

- (10) Connection charges are a means of generating revenue based on new development. The charge amounts can be set proportional to typical water consumption patterns for each type of new user, and are often related to water meter size. Metropolitan currently does not have express statutory authority to impose either a capacity or a connection charge. Proposed legislation (AB 1875) would, however, provide for such a charge. For purposes of this report, it has been estimated that Metropolitan could readily collect approximately \$50 million per year from a connection charge. Connection charges are equitable on the grounds that they require new users to pay for additional system capacity required to serve their demands. The general public supports charges on new development over raising water rates or taxes. Due to the annual fluctuations in new development, connection charges should not be considered a stable source of revenue. The difficulty of administering a connection charge would vary with the mechanisms by which the charge is collected, but such charges would require a greater administrative effort than the collection of water rates. Implementing a connection charge is contingent on documenting that the amount of the charge is justified. It must be demonstrated that there is a "reasonable relationship" between new development and the facilities being constructed with the connection charge revenue.
- (11) A summary of the evaluation of each revenue alternative is presented in Table 6. Water rates, taxes, and annexation fees are rated the highest primarily because each is currently utilized. The other revenue forms are not nearly as highly rated primarily due to administration and implementation difficulties.

Recommendations

- (1) Emphasis on fixed and variable revenue should be diminished. It is in the best interest of Metropolitan, its member agencies, consumers, and the State that the price for water reflects the cost of water.
- (2) Revenue stability can be achieved through increasing revenue diversity (addition of standby, service, and connection charges), rate structuring, and prudent planning for Working Capital Reserves and use of Rate Stabilization Funds when available.
- (3) Working Capital Reserves retained in the Revenue Remainder Fund should be sufficient to provide for emergency repairs and claims (self insurance), a shortfall in water sales due to weather variations, and normal utility working capital. For fiscal year 1992-93 a total reserve of \$199 million is suggested.

- (4) Metropolitan should not budget for restoration of the Water Rate Stabilization and Water Treatment Surcharge Stabilization Funds. It is recommended that up to \$100 million could be reserved in these Funds should excess revenues be generated during periods of high sales.
- (5) Metropolitan should revise its PAYGO policy. PAYGO should be funded with a dedicated revenue source, not water rates. Near term demands of the CIP make it difficult, if not impossible, to meet the current PAYGO policy.
- (6) Metropolitan should adopt a policy which requires new development to pay for the cost of new facilities which provide the capacity to accommodate it.
- (7) Metropolitan should cause charges to be imposed on new development. If Metropolitan is provided the legal authority through new legislation to require that connection charges be paid, it should avail itself of that authority and impose that requirement.
- (8) The maximum legal connection charge amount should be calculated based on the cost of a program of facilities that will provide the capacity to accommodate new development. Alternatively, Metropolitan may choose to calculate the charge amounts based on the cost or value of existing facilities.
- (9) Metropolitan should set connection charge amounts after consideration of the legal maximum amounts, the cost of additional capacity, its planned facility construction program, alternative funding sources, and the burden of the fees on new development.
- (10) Metropolitan's intention should be that the charges are paid at the time of, and as a condition of, connection to a water system. The charge should be based on the size of the water meter installed at a new connection.
- (11) Metropolitan should not collect the connection charges. They should be collected by the retail water agency providing the connection. In some situations it may be determined to be more suitable to have the charges collected by the local government issuing the building permit. Metropolitan should agree to pay an administrative fee to member agencies for collecting the charge.
- (12) Because the revenue requirements facing Metropolitan for the next several years are extensive, it is suggested all available revenue sources be utilized for the next several years. That includes the maximum level of taxes under the MWD Act, standby and service charges at levels currently adopted, and connection charges.

CAPITAL FINANCING

Capital financing needs and available sources of funding were developed to accommodate Metropolitan's capital improvement program. Projected future annual debt service costs were also developed using a mix of debt instruments.

Findings

- (1) Metropolitan currently has \$60 million of outstanding debt in commercial paper. The Board has authorized the issuance of up to \$200 million under this program. Metropolitan's commercial paper has been rated P1/A1 without any liquidity facility or credit enhancement, reflecting how positively the rating agencies view Metropolitan's ability to meet short term cash flow requirements.
- (2) Metropolitan has identified approximately \$6 billion in capital expenditures through the year 2010 (as of December 1991). The bulk of these expenditures, approximately \$2.4 billion or 42 percent of the total, occur in the fiscal years ending 1996 through 1998.
- (3) Metropolitan currently has at least \$35 million in general obligation bonding authority. An additional \$15 million may be available based on discussion with Metropolitan's Bond Counsel.
- (4) Metropolitan is limited to the following statutory limitations on debt issuance:
 - Assessed value limits the amount of debt outstanding to less than 15 percent of the total assessed value of Metropolitan.
 - An asset to liability test limits Metropolitan to a 1:1 ratio on the level of revenue bond debt Metropolitan may have outstanding. The current CIP requires debt issuance which would bump up against this limit by the 1995-96 fiscal year.
- (5) Metropolitan is able to issue Certificates of Participation (COPs) which are believed to not be included as debt in the asset to liability test. Therefore, Metropolitan is not constrained by the asset to liability test in financing the CIP. The major consequence of using COPs would be an increase in the total financing cost for Metropolitan's capital programs.
- (6) Current Metropolitan policy is for PAYGO funding of 20 percent of the capital improvement program (CIP).
- (7) Revenue Bonds are the preferred financing mechanism of Metropolitan. Issues to date have had interest rates below market averages and have been well received. Based on Metropolitan's current financial position and asset to liability restriction, about \$1.65 billion of additional Revenue Bonds could be issued - an amount insufficient to finance the CIP.

- (8) Metropolitan can utilize future connection fees to fund the PAYGO portion of the CIP. This analysis assumes a \$50 million per year.
- (9) The reserve fund size for Metropolitan's outstanding revenue bonds is equal to 50 percent of maximum annual debt service (MADS). This is well below the standard 1.0 x MADS requirement for most revenue bonds in the municipal market and reflects the positive perception of Metropolitan as a credit. As Metropolitan finances the projects identified for the next 20 years, the increased amount of debt outstanding and changes in the municipal market may require increasing the size of the reserve funds to maintain Metropolitan's credit rating.
- (10) Metropolitan may apply for an insurance (surety) policy to replace the funds in a reserve fund. For a fee, the insurance company will guarantee the payment of draws on the reserve funds in the event Metropolitan is unable to make principal or interest payments. Use of surety policies on future bond issues would preserve debt capacity assuming reserves are funded with proceeds.
- (11) Shelf registering future debt borrowings would allow Metropolitan to register with the Securities and Exchange Commission (SEC) a set amount of future borrowing needs. Then as the need or opportunity arise, Metropolitan can access the credit markets for the total amount registered or a smaller increment. Shelf registration has been used by issuers who require frequent access to credit markets. Given the level of borrowing needed to fund the CIP, Metropolitan may benefit from shelf registration. The cost and effort involved in preparing the necessary SEC filings may make this option undesirable.
- (12) Outputs from a computer model developed to assess the impact of capital expenditures on Metropolitan's financial requirements are presented in Tables 7 through 10. Table 7 summarizes the financing assumptions and capital improvement program requirements for fiscal years 1991-92 through 2009-10. The proposed program total is \$5,826,401,000. Table 8 summarizes the proposed funding sources assumed to be used to finance the program, while Tables 9 and 10 summarize the annual debt service requirements related to the CIP financing plan based on 30 year maturities. Table 9 shows that total annual Metropolitan debt service will reach about \$400 million by the year 1998 and about \$500 million by the year 2010.
- (13) Table 11 shows the results of a sensitivity analysis performed by varying the term of debt to 20 and 25 year maturities. By utilizing a 20 year term on future debt issuance, Metropolitan would save 20 percent on the total financing cost and balance sheet acquisition of assets would be 30 percent faster. However, debt service would be 10 percent greater, requiring greater rate increases.

Recommendations

- (1) It should be legally determined that issuance of COPs is not subject to revenue bond debt/equity limitations as soon as practical to allow for the incorporation of this debt mechanism into Metropolitan's financial planning process.
- (2) The Board should consider adopting a long term (i.e. 10 years or longer) CIP. This would provide staff with better input for incorporating the priorities of the Board into future capital plans. This would also enhance the ability of future water rates to anticipate any increased revenue requirements.
- (3) Metropolitan should maintain its continuing dialogue with the rating agencies as the CIP plan is implemented to ensure the preservation of their credit rating.
- (4) Due to the unprecedented magnitude of capital expenditures required over the next decade, Metropolitan should consider the use of surety policies in place of fully funded debt service reserve funds.
- (5) Metropolitan should consider shortening the maturity on some future debt issues to 20 or 25 years. This would reduce the total financing costs and accelerate the accumulation of assets for Metropolitan. The increased annual debt service cost would need to be evaluated against potentially greater rate adjustments.
- (6) Metropolitan should retain its current general obligation bonding capacity (unless additional general obligation approval is obtained) should the need arise to access the credit markets quickly.

REVENUE PROGRAM

The revenue program developed in this study took into account existing programs, financial plans, and projections to focus attention on specific areas where benefits may be realized. The following items were included in the development of a proposed revenue program for Metropolitan: the recently adopted standby and service availability charges; taxes at the full level authorized under the MWD Act; connection charges on new retail customers; an adequate working capital reserve fund; PAYGO funded by connection charges; the continuation of all incentive programs; an examination of the impact of the seasonal storage program; and financing alternatives for the capital improvement program.

Findings

- (1) Table 12 presents projected revenue requirements for Metropolitan from fiscal year 1992-93 to 2009-10. Conditions assumed in Table 12 are termed Alternative A. The table shows that net revenue required from water rates, excluding funding of working capital reserves, increases from \$489.188 million in fiscal year 1992-93 to \$690.258 million in 1993-94. This is an increase of 41

percent. From that point, the indicated annual percentage increases are lower.

- (2) Table 13 presents the required water rates and annual adjustments necessary to meet the requirements indicated in Table 12, assuming a continuation of the seasonal storage program. The fiscal year 1992-93 adjustment of \$47 per acre-foot is indicated to exactly match requirements.
- (3) Table 14 presents water rates analogous to those in Table 13 in which rate adjustments have been smoothed to avoid fluctuations. Additional revenues generated are used to fund the working capital reserve fund. The target for this fund is \$25 million for emergencies and claims, 500,000 acre-feet shortfall of water sales at the rates in effect at the time, plus 45 days O&M expense.
- (4) Calculated and smoothed water rates for the period 1992 through 2000 are shown on Figure 7 with the continuation of the seasonal storage program. The figure shows that rates will need to reach \$544 per acre-foot by the year 2000 under both approaches.
- (5) Rate requirements under Alternatives B, C, and D for the period 1992 through 2010 are presented in Tables 15 through 17. Alternative B assumes that the standby charges do not continue past fiscal year 1993-94. Alternative C assumes that a connection charge is not implemented; however, the standby and service charge continue indefinitely at the adopted levels. Alternative D assumes no new revenue form either a standby charge or a connection charge. Alternatives B and C can be accomplished with the proposed 1992-93 use of Rate Stabilization Funds. Alternative D would require additional use of such funds in fiscal year 1992-93. Indicated rate adjustments for each alternative are shown on Figure 8.
- (6) Rate requirements for all alternatives are repeated for the case in which the seasonal storage program is not continued in Tables 18 through 22. Similarly, Figure 9 compares the calculated and smoothed annual rate increases for the years 1992 through 2000 in the absence of the seasonal storage program.
- (7) Figure 10 presents annual rate projections under the four alternatives. Without a seasonal storage program, water rates would need to be about \$500 per acre-foot by the year 2000.
- (8) The cost of the seasonal storage program is graphically demonstrated on Figure 11. With discontinuance of the program, the indicated smoothed water rate increases from 1993-94 through 1995-96 can be \$50 per acre-foot per year. With the seasonal storage program, the indicated smoothed increases for those years would be \$75 per acre-foot, although less in subsequent years.
- (9) Connection charges could be increased above the amounts shown in Table 12 to generate greater amounts of revenue. Increasing charges on an annual basis

is a common utility practice and could lower projected water rates by approximately \$25 per acre-foot by the year 2010.

- (10) Standby and/or service charges could be increased beyond projected levels to generate additional revenues. An increase in the standby charge to \$10 per parcel next year and beyond would help to reduce the indicated 1993-94 rate adjustment by about \$10 per acre-foot.
- (11) Reducing the level of subsidies provided under the various water management programs by one-half could lower water rates by \$25 per acre-foot by the year 2010.

Recommendations

- (1) Metropolitan needs to increase the level of integration of its financial planning models. These models should cover at least a ten-year time frame, and link capital improvement program planning to financing and rate requirements. An additional ten-year planning horizon may be beneficial if significant CIP requirements extend past ten years.
- (2) Financial information presented to the Board should clearly demonstrate the short term and long term water rate impacts of alternatives and actions presented for their decision. An integrated long term financial planning model would enable future rate comparisons of various alternatives.
- (3) A working capital reserve with a balance based on a potential decrease of sales totaling 500,000 acre-feet, adequate emergency reserves, and a routine working capital allowance should be established. During the study period, a working capital reserve ranging from \$199 million next fiscal year to about \$700 million by the year 2010 is indicated. Working capital reserves should never be used to avoid rate increases.
- (4) Near term financial requirements arising from the CIP may be too great to fully fund a working capital reserve prior to 1996-97. Accordingly, Metropolitan will need to closely monitor revenues and expenditures until that time.
- (5) Rate setting should not be tied strictly to annual revenue requirements. Efforts should be made to use reserves to smooth out rate adjustments, not avoid their needs. It is suggested that rates should not be decreased unless there is a permanent decrease in costs. Likewise, rates should not be increased commensurate with only a one year spike in costs. Rate setting should be done within the context of a long term plan for revenues and expenses.

ALTERNATIVE RATE STRUCTURES

Work performed under this task explored alternative rate structures for Metropolitan. Tiered, uniform volume, demand, marginal cost pricing, and life-line based rates were

described and evaluated based on their applicability to Metropolitan, potential for legal challenge, equity, consistency with Metropolitan policy, implementation and administrative issues, customer acceptance, revenue stability, and conservation impact.

Findings

- (1) A tiered rate is one in which the unit price of water changes as the customer's total use during a billing period changes. Variations of the tiered rate structure include inverted and declining block rates. Due to the wide variability in the size of Metropolitan's customers, only a multiple block structure or a variable two-block increasing rate structure would appear to be applicable. This type of rate form is illustrated in Table 23. No legal challenge would be anticipated from this rate form; however, an inverted block rate will generally not reflect cost causation patterns (such as demands) among various sized users and may be considered inequitable leading to some degree of dissatisfaction among Metropolitan's customers. This rate structure does not appear to be inconsistent with Metropolitan policy, although the administration of such a rate would be more difficult than the current uniform rate. Implementation would require a full billing analysis and a study of the impact on the various wholesale customers, as well as modifications to the existing billing system to reflect the inverted rate. Inverted block rates could cause a certain degree of revenue instability since they inherently encourage reduced consumption. Furthermore, their effect on conservation levels at the wholesale level is considered minimal. A purchasing agency may find it less expensive to produce its own water, or store water purchased at a lower block rate, than to buy water under the inverted rate.
- (2) The simplest form of a wholesale rate is a uniform volume rate. This is the rate structure currently used by Metropolitan. It establishes uniform rates for all customers for a respective class of service. No legal challenges would be anticipated from continuing with the current rate structure. Uniform volume rates are somewhat inequitable in that they do not distinguish variations in cost of service to individual customers. Since this is Metropolitan's current rate structure, there are essentially no issues associated with implementation and administration or consistency with Metropolitan policy. However, uniform volume rates are inherently unstable, in that revenue produced is a function of sales. Uniform rates do not encourage conservation since there is no price signal or penalty associated with water overuse.
- (3) A demand (or demand-commodity) rate structure is a two or more part rate which charges both for the volume of water consumed and for the peak rate of flow or demand on the delivery system. A demonstration of this rate structures applicability to Metropolitan is presented in Table 24. No legal challenge would be expected from implementation of a demand-commodity rate structure, and it is generally considered equitable since it charges each customer in a uniform manner for its demand on the system's capacity requirements. This rate structure does not appear inconsistent with Metropolitan policy.

Implementation would require a detailed cost study to identify demand related and commodity related costs, and the modification of the billing system to accommodate two billing determinants: volume and demand. A demand-commodity rate would negatively impact customers with high peak to average demand ratios that cannot be served out of system storage within their own agency. This rate form would contribute to revenue stability. The demand-commodity rate may indirectly encourage conservation by discouraging purchases during peak seasons. The level of conservation may be reduced if agencies choose to store water during off-peak periods for use during peak seasons.

- (4) A marginal-cost rate structure is designed to set rates equal to the cost of providing the next increment, or marginal unit(s), of service to the customer. True marginal cost rates are difficult to define, develop, and implement. Metropolitan currently has five programs based upon marginal cost pricing principles: the Local Projects Program, the Conservation Credits Program, the Seasonal Storage Program, the Incremental Interruption and Conservation Plan, and the Groundwater Recovery Program. Incorporating marginal rates structure could be equitable and would not be inconsistent with Metropolitan policy. However, such pricing structures can be very complex to develop, explain, and understand. A thorough marginal cost study would be required prior to implementation. Moving from a traditional rate structure to one based on marginal-cost pricing could particularly impact large volume users. This impact and overall rate stability would generally depend on how marginal costs are determined, reconciled with actual cost of service and revenue requirements, and implemented through the rate structure. A major objective of marginal-cost pricing is to impress upon the customer the value of the resource. A properly designed marginal-cost rate should therefore promote conservation.
- (5) Life-line rates involve offering a resource to disadvantaged customers below its cost of service. Life-line rates at the wholesale level generally do not exist. Such a program could be implemented if member agencies wished to pass along any discounted rate to their disadvantaged customers. Such a program would likely have negligible impact on Metropolitan's rates and revenues if the discount given is not excessive.
- (6) Table 26 provides a summary of the evaluation factors for each alternative rate form discussed. The demand-commodity rate is ranked highest, with the uniform volume rate second.

Recommendations

- (1) Metropolitan should explore implementation of a rate form which recognizes both the volume of water purchased and the peak demand placed on its system by member agencies. Such a rate form would enhance overall equity and

improve revenue stability. Further study is required to evaluate alternative approaches to implementing such a rate form.

- (2) A detailed cost allocation study should be undertaken to determine appropriate, cost based commodity-demand rate structures.
- (3) Commodity demand rates should be phased in. Depending upon the methodology of setting and charging such rates, it may be possible to phase out seasonal storage rates. Member agencies could then develop long term capital programs which include appropriate storage in response to Metropolitan demand based rates.

EQUITY CONSIDERATIONS

This task identified alternative accounting methods, under Generally Accepted Accounting Principles, which might enhance Metropolitan's equity position. The procedures reviewed included conservation expense capitalization, amortization, off-balance sheet financing, borrowing restriction, land sales, and replacement cost accounting.

Findings

- (1) Metropolitan currently expenses the costs of its conservation programs as incurred.
- (2) Due to the difficulty in quantifying conservation program benefits to Metropolitan's capital program, capital treatment of program expenditures under general principles of capitalization and amortization is not justified.
- (3) Deferring conservation program costs through the deferral accounting provision in the Statement of Financial Accounting Standards No. 71, "Accounting for the Effects of Certain Types of Regulation," is not applicable to Metropolitan. Conservation program costs are recovered through inclusion with operating expenses in the year incurred.
- (4) Metropolitan's method of computing an annual amortization expense for "on-aqueduct" facilities on the State Water Project is unusual, since it involves anticipating future capital costs in the cost of current deliveries and must rely of state engineers for estimates of both future water deliveries and future capital costs.
- (5) If the straight-line method of amortization is used for State Water Project on-aqueduct facilities, it is estimated that amortization would have been approximately \$39 million as compared to \$92 million.
- (6) In the absence of the ability to accurately estimate water deliveries over the contract period for the purposes of calculating a per unit delivered water cost

over the period, straight-line amortization appears to be the appropriate method for amortizing costs associated with Participation Rights for both the Imperial Irrigation Project and, upon completion, the Santa Margarita Project.

- (7) Two scenarios were found where off-balance sheet financing could potentially be used:
- To finance Metropolitan's share of participation in a project.
 - To finance construction of facilities for member agencies which are subsidized by Metropolitan under its water management programs.

It is not indicated that off-balance sheet financing would be of advantage to Metropolitan in improving its debt-to-equity ratio position in either of the above situations.

- (8) Under Section 239.2 of the Metropolitan Water District Act, Metropolitan is restricted in its revenue bond borrowing to a 1 to 1 debt to equity ratio. This requirement effectively restricts Metropolitan's revenue bond debt capacity to the amount of its equity and appears to allow for future revenue bond debt equal to approximately \$1,650 million plus amounts of future equity increases.
- (9) Table 27 presents results of a survey conducted to compare how the Metropolitan-type borrowing restriction compares to the policies of other large utilities in the financial marketplace. No other utility was found to have a legislated limit such as Metropolitan. It was found that the average debt-to-equity ratio among the selected utilities is approximately 4.5 to 1, and that only nine of thirty-three had ratios of less than 1 to 1.
- (10) Metropolitan could utilize excess land inventory for cash generation through sale, lease, or alternative use. Under generally accepted accounting principles, it is unlikely that a sale-leaseback or like-kind exchange transaction would result in the recognition of gain and improve equity. Land sales could increase equity.
- (11) Replacement cost or fair value accounting is currently not available to Metropolitan under generally accepted accounting principles. Use of current value accounting is prohibited at this time for operating companies and changes do not appear to be forthcoming.

Recommendations

- (1) It is recommended that Metropolitan's policy for amortizing on-aqueduct costs of the State Water Project be reevaluated. It is not suggested that the straight-line method would be more appropriate in Metropolitan's circumstances; however, a significant difference exists which warrants investigation and reaffirmation.

- (2) The costs of Participation Rights of the Imperial Irrigation Project should continue to be amortized on a straight-line basis. Similarly, upon completion, Participation Rights of the Santa Margarita Project should be amortized using the same methodology.
- (3) The sale of land is one apparent opportunity for Metropolitan to enhance its equity position. It is recommended Metropolitan's current procedure for tracking and evaluating its land inventory be refined to include a report which arranges land and real estate assets into categories by use and importance to Metropolitan. Assets which are of lesser or marginal use and importance may then be considered for sale, lease, or other alternative use.

BUDGETING

The appropriateness and effectiveness of Metropolitan's current budgeting policies was the focus of this analysis. The review is intended to examine the relationship between its capital construction program, water demand forecasting, and development of its budgets and revenue requirements.

Findings

- (1) The budget process used by Metropolitan occurs throughout the fiscal year and can be divided into three phases:
 - Budget Formulation and Preparation.
 - Review and Revision.
 - Execution and Control.

Figure 12 presents a fiscal year calendar showing key milestones in the preparation of Metropolitan's Annual Budget.
- (2) The Capital Projects Program is prepared independently of the Annual Budget. The current budget procedures do not include any analysis of the impact of completed capital projects on annual operating costs.
- (3) The Annual Budget includes only capital projects which are funded during the budget year. Projects which begin after the budget year are not shown. Consequently, there is no adopted long range financial planning document which shows both annual expenditures and the total capital program.
- (4) Managers responsible for budget preparation occasionally find it difficult to accurately forecast the impact of extensive and changing environmental and health and safety regulations which may affect worker productivity. Consequently, the full impact of regulatory compliance is not always reflected in the five year plans prepared by Division Managers. Meeting the costs of

regulatory compliance are likely to be a significant revenue need of Metropolitan during the next ten years.

- (5) Analysis of maintenance procedures by other consultants have indicated adequate allowances for preventive maintenance activities have not been included in the Annual Budget.
- (6) Several of the Metropolitan personnel interviewed indicated that meeting budget submittal schedules while performing normal duties is sometimes difficult.
- (7) Several of the Metropolitan personnel interviewed stated that the timing of capital project requests presents difficulties. Engineering requires all requests be submitted annually by August to facilitate preparation of the CIP. Personnel from Operations would prefer submitting requests on a continuous basis.
- (8) Several of the Metropolitan personnel interviewed stated that they believed it is unclear as to "when a Project becomes a Project." Although Metropolitan's Budget Manual identifies the approval process, the lack of a Board approved long term capital program appears to cause confusion. The lack of a Board approved long term program also results in projects being assigned a priority on an ad hoc basis rather than in the context of a defined plan.

Recommendations

- (1) Metropolitan should prepare for adoption a formal ten year financial plan which includes both operating expenditures and capital projects. The plan would serve as the key planning document for the evaluation of capital projects. The plan should include realistic estimates of down-stream operating costs of capital projects. The plan should be submitted to Metropolitan's Board of Directors for review and approval. If the plan is based on SCAG and SANDAG growth estimates it should not be subject to CEQA requirements.
- (2) Metropolitan should continue to ensure that branch and section managers are informed of regulatory requirements affecting worker productivity and personnel requirements.
- (3) Metropolitan should review its maintenance procedures and revise its budget estimates as appropriate, to increase preventive and predictive maintenance activities.
- (4) Metropolitan should continue to automate the budgeting process to facilitate its preparation within the required time constraints.
- (5) Metropolitan personnel should be encouraged to submit requests to Engineering for capital projects as their need is identified.

BACKGROUND

When Metropolitan was formed, its sole source of revenue was an ad valorem tax levied on real property. After the completion of the Colorado River Aqueduct and the beginning of water deliveries in 1941, Metropolitan developed a relatively simple wholesale water rate structure. Initially, Metropolitan had only two rates, one for untreated water sales and a second for treated water sales. That structure was based a fundamental cost-of-service principle which held that water users and property owners who benefit from imported water should bear the resulting costs. In addition to a philosophy adhering to cost of service principles, Section 134 of the Metropolitan Water District Act requires like classes of water service to be offered at like prices regardless of location within the service area.

This latter principle reflected a commitment to develop a highly integrated distribution system. By providing substantial redundancy in the major transmission and distribution facilities, Metropolitan is able to provide a highly reliable level of service. One consequence of this degree of system integration is that improvements in one part of the system generally enhance system capability and reliability for all users regardless of location of the project or of the user. This concept of system design supports Metropolitan's policy of offering uniform rates to all member agencies. Over time, Metropolitan's rate schedules have become more complex as pricing policy has been used to address a growing array of water management issues.

RATE AND REVENUE HISTORY

Overview

Metropolitan currently receives revenues from the sales of untreated and treated water, sales of electricity, ad valorem taxes, and other miscellaneous sources. Table 1 shows revenues by source for fiscal years 1982 through 1991. Revenues from water sales have increased over time and currently represent sixty-nine percent (69%) of Metropolitan's total revenues. The basic rate for untreated water has increased from \$8 per acre-foot (AF) in fiscal year 1941-42 to \$222 per AF for fiscal year 1991-92. During the same period, Metropolitan's general tax rate has been gradually reduced from a peak equivalent rate of 0.1250 percent of full assessed valuation in fiscal year 1945-46 to 0.0089 percent of full assessed valuation in fiscal year 1991-92. In 1991, tax revenues represented only thirteen percent (13%) of total revenues.

The change from tax based financing to sales based financing has resulted in greater variability in annual revenues. Table 2 presents a history of water sales and revenue from fiscal year 1970-71 to 1990-91. Figure 1 graphically presents the data from Table 2. Figure 2 shows the average revenue per delivered acre-foot for the same period. The figures highlight the increases in deliveries by Metropolitan over this period, as well as the increase in the average charge for water delivered by Metropolitan. Since fiscal years 1984-85, however, the average revenue derived per acre-foot of water sales has declined until the current fiscal year when Metropolitan adopted a rate increase.

TABLE 1

TEN-YEAR SUMMARY OF REVENUES BY SOURCE
Accrual Basis

(Dollars in Millions)	Fiscal Year (Ending June 30)	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
	Total Revenue	244.3	247.9	367.8	427.6	462.1	510.5	521.3	572.4	664.5	595
Water Sales	Amount	146.1	145.7	245.6	315.8	329.3	373.5	392.6	424.9	468.8	411.9
	Percent of Total	59.8%	58.8%	66.8%	73.9%	71.3%	73.2%	75.3%	74.2%	73.3%	69.2%
Power Recoveries	Amount	6.1	10.6	11.7	16.5	18.9	22.3	17.6	18.6	19.2	15.1
	Percent of Total	2.5%	4.3%	3.2%	3.9%	4.1%	4.4%	3.4%	3.2%	2.9%	2.5%
Taxes Levied	Amount	60.7	56.4	82.5	64.9	73.2	77.4	65.1	69.7	81.4	75.5
	Percent of Total	24.8%	22.8%	22.4%	15.2%	15.8%	15.2%	12.5%	12.2%	12.2%	12.7%
Interest on Investments	Amount	28.2	21.4	21.8	27.5	34.3	31.9	39.6	51.5	75.2	67.2
	Percent of Total	11.5%	8.6%	5.9%	6.4%	7.4%	6.2%	7.6%	9.0%	11.3%	11.3%
Annexation Income	Amount	1.2	11.4	3.8	0.4	4.1	2.5	0.6	0.6	1.9	25.3
	Percent of Total	0.5%	4.6%	1.0%	0.1%	0.9%	0.5%	0.1%	0.1%	0.3%	4.3%
Other income	Amount	2.0	2.4	2.4	2.5	2.3	2.9	5.8	7.1	--	--
	Percent of Total	0.8%	1.0%	0.7%	0.6%	0.5%	0.6%	1.1%	1.2%	0.0%	0.0%

TABLE 2

METROPOLITAN WATER DISTRICT
TOTAL WATER DEMAND & WATER SALES REVENUE

FISCAL YEAR	TOTAL WATER DEMAND A/F	ANNUAL CHANGE %	WATER SALES REVENUE \$1,000,000	ANNUAL CHANGE %	AVERAGE REVENUE \$/AF	ANNUAL CHANGE %
70-71	1,129,679.0	-2.04%	47.1	3.29%	41.69	5.44%
71-72	1,251,516.0	10.79%	56.7	20.38%	45.31	8.66%
72-73	1,172,525.0	-6.31%	57.9	2.12%	49.38	9.00%
73-74	1,268,159.0	8.16%	65.0	12.26%	51.26	3.80%
74-75	1,344,776.0	6.04%	67.8	4.31%	50.42	-1.64%
75-76	1,409,624.0	4.82%	79.9	17.85%	56.68	12.43%
76-77	1,389,897.0	-1.40%	88.2	10.39%	63.46	11.95%
77-78	1,196,745.6	-13.90%	81.1	-8.05%	67.77	6.79%
78-79	1,235,507.8	3.24%	98.7	21.70%	79.89	17.88%
79-80	1,281,879.2	3.75%	111.2	12.66%	86.75	8.59%
80-81	1,463,010.6	14.13%	141.3	27.07%	96.58	11.34%
81-82	1,503,175.8	2.75%	146.1	3.40%	97.19	0.63%
82-83	1,226,361.2	-18.42%	145.7	-0.27%	118.81	22.24%
83-84	1,426,732.0	16.34%	245.6	68.57%	172.14	44.89%
84-85	1,574,951.4	10.39%	315.8	28.58%	200.51	16.48%
85-86	1,646,891.1	4.57%	329.4	4.31%	200.01	-0.25%
86-87	1,825,926.5	10.87%	373.5	13.39%	204.55	2.27%
87-88	1,926,252.6	5.49%	392.6	5.11%	203.82	-0.36%
88-89	2,108,889.9	9.48%	424.9	8.23%	201.48	-1.15%
89-90	2,500,662.5	18.58%	486.8	14.57%	194.67	-3.38%
90-91	2,264,644.1	-9.44%	411.9	-15.39%	181.88	-6.57%

NOTES:

- [1] Total water deliveries are taken from MWD--Operations Planning summary of demands by type and use: Reports S20-72A & S21-72A.
- [2] Water Revenues are taken from MWD Annual Reports.

METROPOLITAN FISCAL YEAR DELIVERIES & REVENUE

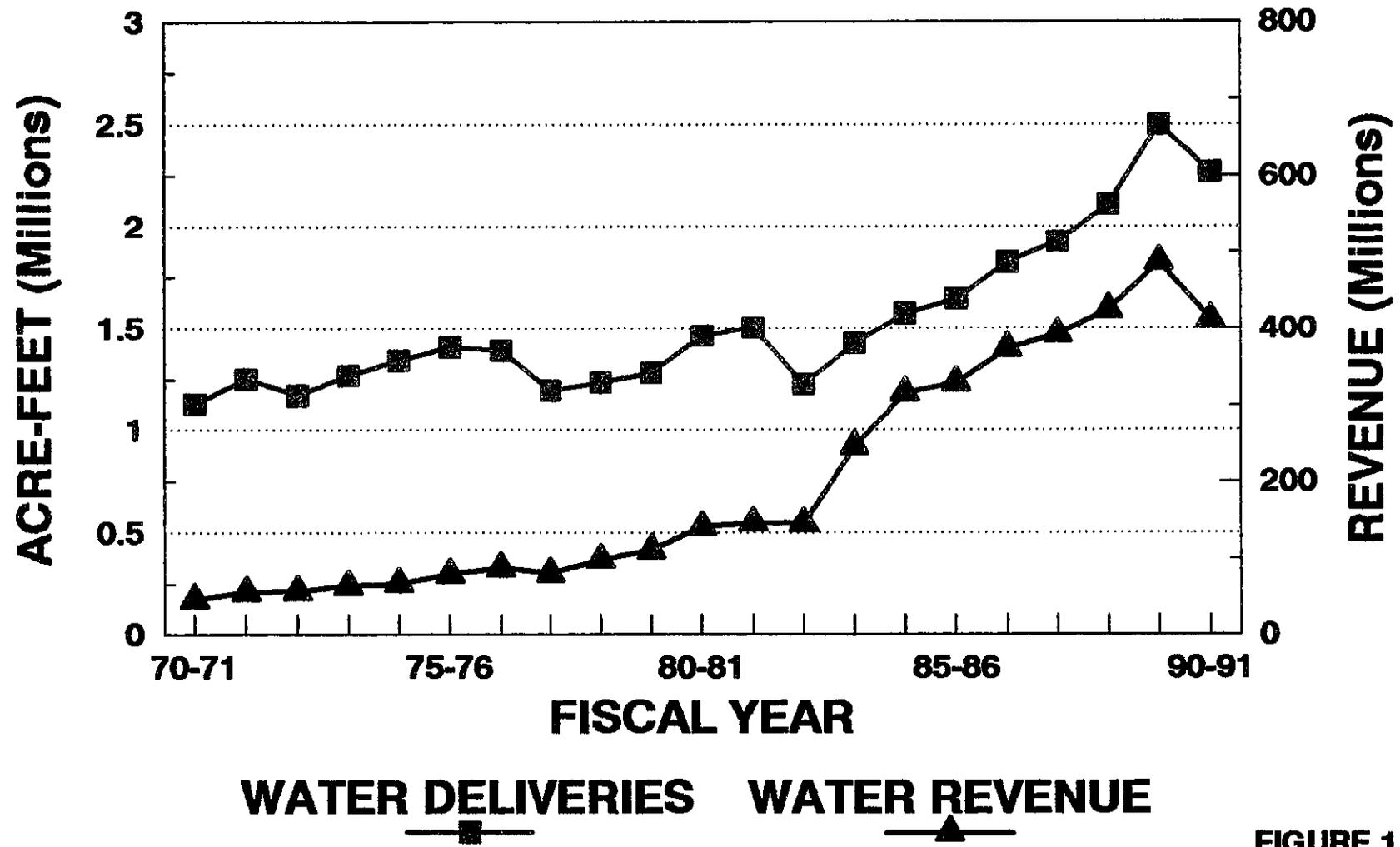
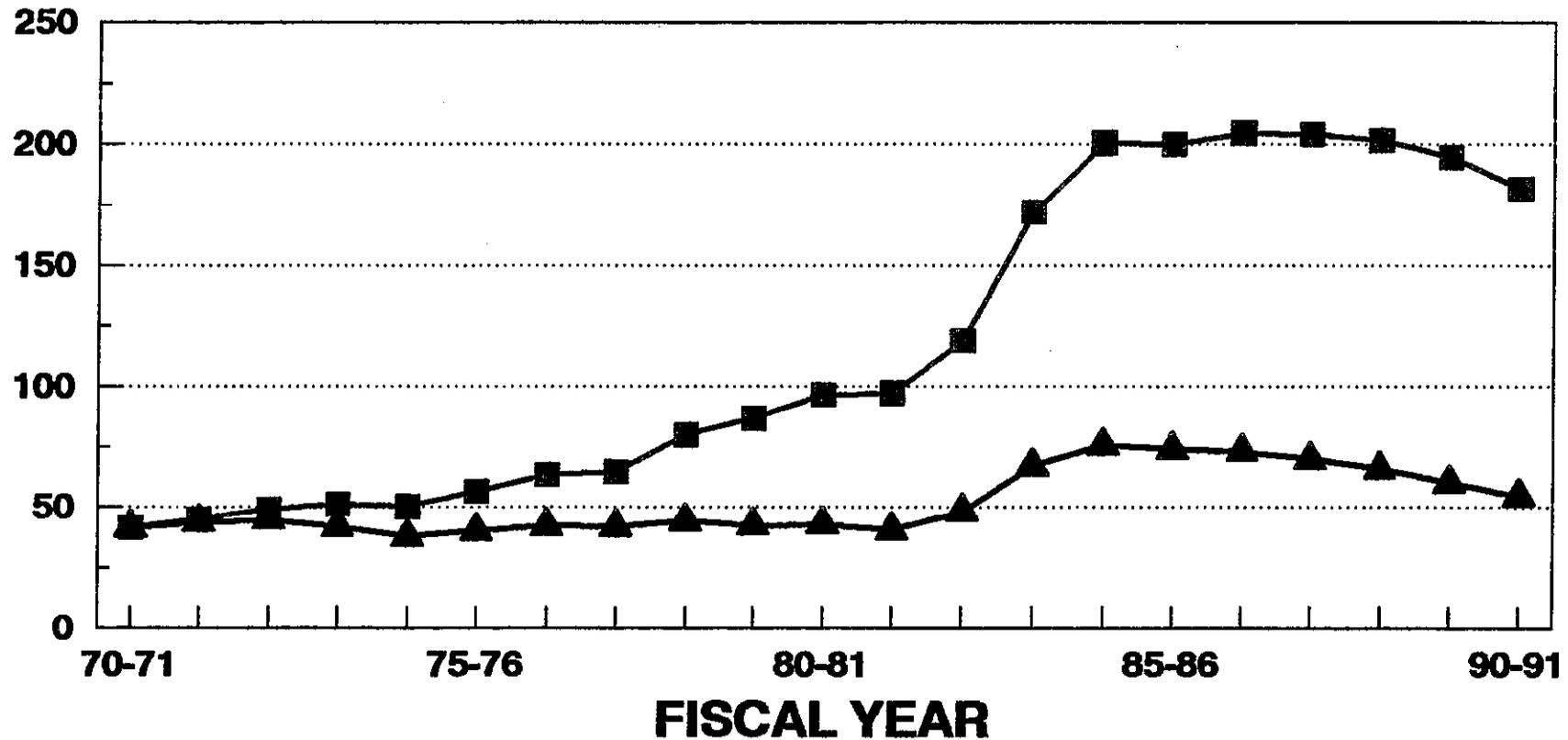


FIGURE 1

METROPOLITAN WATER DISTRICT UNIT WATER SALES REVENUE

Unit Sales Revenue (\$/AF)



Actual \$/AF



Deflated \$/AF



FIGURE 2

Current Wholesale Water Rate Structure

Metropolitan provides both treated and untreated water to its member agencies. Its basic wholesale water rates are differentiated by treated and untreated and by class of service, but not by location or time of service.

Starting in 1981, the rate structure was altered substantially by introducing interruptible and noninterruptible service classes. Table 3 presents a summary of water rates in effect from 1982 through 1991. Effective July 1, 1992, untreated noninterruptible water will increase \$47 per acre-foot. All other rates will also increase. As discussed elsewhere in this section, the basic rate structure is augmented by a number of programs designed to provide economic incentives for water use.

Classes of Service

Noninterruptible Water Service. Water supply requiring continuity of service is delivered as noninterruptible supply. Noninterruptible service is normally selected for domestic and municipal purposes. It is not subject to interruption or reduction in supply except under exceptional circumstances.

Interruptible Water Service. Interruptible service includes that portion of water delivered for domestic and municipal purposes which can be interrupted or restricted for a one-to-three-year period. Some interruptible supplies are used for direct groundwater replenishment (spreading), in lieu groundwater replenishment (achieved by not pumping from a groundwater aquifer), surface reservoir storage, or seawater barrier projects. Interruptible service also includes water delivered for agricultural purposes. Agricultural water deliveries can be interrupted for an indefinite period upon one-year's notice. Interruptible service was suspended effective April 1, 1991.

Emergency Water Service. Emergency service is available to interruptible water service customers when a member agency is unable to sustain an agreed interruption and requests uninterrupted water deliveries for the duration of the emergency.

Seasonal Water Service. Water is provided during the months of October through April at the discretion of the General Manager to qualifying member agencies to be stored for later use. This water is sold at a discounted rate in return for a commitment from the agency to make increased use of local water supplies during the summer peak demand period or during future years of inadequate supplies.

Reclaimed Water. Treated wastewater is provided for non-potable purposes at a number of locations. It is available as a result of Metropolitan's financial participation in local reclamation projects. The wholesale price of reclaimed water is set below its production cost and substantially below the price for potable water in order to encourage the use of reclaimed water.

TABLE 3

TEN-YEAR SUMMARY OF WATER RATES
(Dollars per Acre-Foot)

	NON-INTERRUPTIBLE Domestic, Groundwater Replenishment and Reservoir		INTERRUPTIBLE ¹ Domestic, Groundwater Replenishment Agricultural and Reservoir		EMERGENCY Domestic		SEASONAL STORAGE ¹		RECLAIMED
	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	
7/1/81-6/30/82	\$121	\$96	\$86	\$61	\$325	\$300			
7/1/82-6/30/83	\$140	\$114	\$105	\$79	\$344	\$318			
7/1/83-12/31/83	\$172	\$144	\$128	\$100	\$429	\$401			\$84
1/1/84-6/30/84	\$225	\$197	\$181	\$153	\$482	\$454			\$84
7/1/84-6/30/85	\$229	\$197	\$185	\$153	\$623	\$591			\$84
7/1/85-6/30/86	\$224	\$192	\$180	\$148	\$618	\$586			\$84
7/1/86-6/30/87	\$230	\$197	\$186	\$153	\$624	\$591			\$84
7/1/87-6/30/88	\$230	\$197	\$186	\$153	\$624	\$591			\$84
7/1/88-6/30/89	\$230	\$197	\$186	\$153	\$624	\$591			\$84
7/1/89-6/30/90	\$230	\$197	\$186	\$153	\$624	\$591	\$135	\$115	\$84
7/1/90-6/30/91 ²	\$230	\$197	\$186	\$153	\$624	\$591	\$135	\$115	\$84
7/1/91-6/30/92	\$261	\$222	\$211	\$172	\$705	\$666	\$154	\$130	\$84

¹Rates for interruptible service and seasonal storage service are reduced by \$5.00 per acre-foot for water sold to any member public agency whose governing body adopts a resolution stating its commitment that the savings resulting from such reduction will be placed into a special account to be used for programs to store or conserve water that will be available to meet domestic or municipal demands.

²Interruptible service was suspended on April 1, 1991.

WATER MANAGEMENT PROGRAMS

A number of water management programs exist which augment the price of water. These are discussed the following paragraphs.

Interruptible Water Service Program of 1981

In March 1981, the Board adopted the Interruptible Water Service Program. The program provides economic incentives to encourage member agencies to store imported water in surface reservoirs or groundwater basins for subsequent use during periods of supply shortfalls. The interruptible rate also facilitates the sale of surplus water to agricultural and other users such as agricultural, groundwater replenishment, seawater barrier and reservoir storage who do not require a commitment to continuous, uninterrupted service.

Under the Interruptible Water Service Program, Metropolitan provides imported water to its member agencies at discounted rates for local storage. The stored water is to be used when there is a temporary deficiency in imported supplies. A participating agency is required to:

- Submit a statement that it will be able to sustain a reduction or interruption without adversely affecting service to the public and that it has or will have sufficient storage and distribution facilities to do so.
- If the agency's statement shows reliance on water stored in an adjudicated groundwater basin (where pumping restrictions have been established through litigation), the agency must obtain special permission to increase groundwater withdrawal in the event of interruption.

The amount of water available for interruptible service during each 12-month period beginning in July is determined by the Board of Directors in March. To assist member agencies in operating their systems, estimates of the availability of interruptible water are made for two additional years. The General Manager is authorized to reduce or eliminate any delivery of interruptible water during an emergency.

All agricultural deliveries are sold as interruptible service. These deliveries can be reduced or interrupted with one year's notification if the interrupted supplies are needed for domestic or municipal uses within Metropolitan's service area. Water deliveries under interruptible service represented approximately one-third of all Metropolitan deliveries during fiscal year 1989-90. During 1991, because of the continuing drought, delivery of interruptible water was cut by 50 percent. The interruptible rate was suspended on April 1, 1991.

Local Projects Program of 1981

The Local Projects Program (LPP) was created in 1981 to stimulate reclamation activity in Metropolitan's service area. Reclamation and reuse of wastewater is an effective means of reducing demands for imported water. A regional goal has been established to reclaim as much as 615,000 AF annually by 2010. Where feasible, reclaimed water is directly reused to irrigate large turf areas such as parks, golf courses, and cemeteries. However, the availability of suitable sites for the direct reuse of reclaimed water significantly constrains reclamation activity. Consequently, reclaimed water is also used to recharge groundwater basins, when the approval of local and state health agencies can be obtained.

Metropolitan's policy is to encourage reclamation when economically justified. Given the level of wholesale rates in Southern California, a considerable amount of reclamation activity "pays for itself"--that is, the cost of the reclamation project is less than the cost, over time, of purchasing the equivalent amount of water from Metropolitan. In other cases, however, the financial incentive provided by the existing wholesale rate structure does not, by itself, justify local agency investment in an otherwise efficient reclamation project due to its cost.

To ensure adequate investment in such projects, the Local Projects Program was first developed in 1981 and has been modified twice since 1981. As originally implemented, Metropolitan provided capital funding to local agencies and acquired ownership of a share of the project yield. Under this version of the program, Metropolitan contributed approximately \$10 million toward construction of the South Laguna Reclamation Project and the Las Virgenes Reclamation Project. These two projects are operational and have a maximum combined yield of approximately 3,600 AFY. Metropolitan also negotiated an agreement to participate in the Arlington Basin Desalter Project, from which Metropolitan will purchase approximately 6,100 AFY of desalted water.

The LPP was temporarily suspended in 1983 and reintroduced with substantial modifications in 1985. The revised program offered applicants two payment options. The payment could be calculated using the previous capital-based formula or using a commodity-based formula which determined the total payment on the amount of water reclaimed. The commodity-based payment formula, established in 1985, reflected the potential energy cost savings from reduced water imports. The LPP subsidy for reclaimed water using the avoided cost formula was \$75 per AF in 1989.

In March 1990, the Metropolitan Board revised the commodity-based formula, more than doubling the LPP payment to \$154 per AF. The new formula is no longer limited to avoided energy costs. It recognizes reclaimed water may reduce capital and other costs in addition to reducing energy costs. This recognition made it appropriate to substantially increase incentives for investment in reclamation projects.

Under the LPP program, financial incentives for investment by the local water agency arise from both the direct LPP payment and from the reduction in the amount of

imported water that must be purchased from Metropolitan at the normal wholesale rate. At current rates, local production of reclaimed water displaces the need for payments to Metropolitan of up to \$261 per AF. Combined with the current direct payment of \$154 per AF, the LPP creates a net financial incentive which is equivalent to having the marginal cost of water at \$415 per AF.

Water Conservation Credits Program of 1988

The Conservation Credits Program, approved by the Metropolitan Board in 1988, was patterned after the LPP. Like the LPP, the Credits Program adjusts Metropolitan's basic wholesale rate structure to create financial incentives at the margin for the development of effective conservation programs. Under the Credits Program, water agencies receive a financial payment for implementing a conservation program based on the amount of water expected to be saved. The original payment was based on avoided energy costs, but in June 1990 Metropolitan increased the Conservation Credits payment to \$154 per AF, consistent with the earlier revision in the LPP. Conservation projects funded under the Credits Program now receive this higher amount, subject to the condition that Metropolitan will pay a maximum of one-half of total program costs.

Like the LPP, the Credits Program effectively provides the same price signal to Metropolitan's water agency customers as an increase in the wholesale rate up to \$415 per AF.

Precise estimates of the long-term conservation savings expected from this pricing policy cannot be provided at this time. Even the estimated savings for funded projects are subject to considerable uncertainty, because of the lack of reliable field measurements of water use reductions.

The Conservation Credits Program is expected to be the primary vehicle for the implementation of urban "Best Management Practices" (BMPs) in Metropolitan's service area. The BMPs represent an extensive set of urban conservation practices which California urban water suppliers will agree to implement as a result of negotiations with a wide variety of environmental and public advocacy organizations.

Seasonal Storage Program of 1989

The Seasonal Storage Program, adopted by Metropolitan in 1989, provides an incentive for member agencies to purchase imported water between October 1 and April 30 for local storage. The objectives of the program include (1) achieving greater conjunctive use of imported and local supplies, (2) encouraging construction of additional local production facilities, and (3) reducing member agencies' dependence on Metropolitan's deliveries from May 1 to September 30.

The current seasonal rates are \$130/AF for untreated water and \$154/AF for treated water. These rates create an effective summer-winter price differential of \$92/AF and \$107/AF, respectively, for untreated and treated water.

Greater utilization of existing and potential local agency storage reserves is generally regarded as an economical method of providing a portion of needed storage in the District's service area. Metropolitan's plans for new system additions and supplies presume an improved use of local storage can be encouraged with economic incentives from Metropolitan.

During the 1990-91 fiscal year approximately sixteen percent (16%) of all Metropolitan deliveries were under the Seasonal Storage Program. The deliveries of seasonal water are expected to increase in the future as member agencies acquire the ability to store greater amounts of water.

The seasonal storage program presents member agencies with opportunities to reduce their cost of water. However, because the program can be terminated upon the decision of the General Manager, member agencies are not fully able to rely on the program in developing their long term capital improvement programs.

Incremental Interruption and Conservation Plan of 1991

As California entered into a fifth consecutive drought year in 1990, Metropolitan and member agencies devised a new plan called Incremental Interruption and Conservation Plan (IICP) to significantly reduce water demands. Under the plan, each agency is assigned a monthly conservation target of water from Metropolitan. The plan is structured so it can be staged to allow Metropolitan and member agencies to hold as much water in reserve as possible for the eventuality of a continuing drought condition beyond 1991.

The program is illustrated in Table 4. Stage I of the plan is voluntary. No disincentive charges are used in this stage. In Stages II through V, agencies exceeding the target quantity will face a disincentive charge for all water used over their target quantity. The disincentive charge is in addition to the applicable water rate. The disincentive charge is twice the 1989-90 untreated noninterruptible rate (or \$394/AF). In all cases, the conservation payment and charges only apply to deliveries from Metropolitan and not to total water usage.

Beginning in March, 1991, Metropolitan operated under Stage V of the IICP which was designed to reduce demands for imported water by 31 percent. Under this level of rationing, Metropolitan's water sales this year are expected to be about 1,830,000 AF, compared to sales of about 2,560,000 AF in 1990 and sales in 1991 of about 2,400,000 AF. On March 27, 1992, the District began operations under Stage I, requiring voluntary reductions of ten percent (10%) from 1989-90 usage levels.

The IICP is essentially a type of increasing block rate structure under which the marginal wholesale price of water depends upon whether or not the member agency achieves the percentage reduction conservation target. If demand reductions exceed the target specified by Metropolitan's Board, the lower block price is paid. If demand is higher than the target level, then an effectively higher marginal block price must be paid. Initially, the program had an incentive payment if conservation levels

TABLE 4

THE INCREMENTAL INTERRUPTION AND CONSERVATION PLAN

Stage	Reductions from Base Year		Expected Savings (AFY)
	Reduction Target in Non-firm Deliveries (Percent)	Conservation Target of Firm Deliveries (Percent)	
I	Voluntary	Goal 10	100,000
II	20	5	260,000
III	30	10	430,000
IV	40	15	600,000
V	50	20	770,000
VI	90	30	1,300,000

exceeded targeted levels. That portion of the program was discontinued due to cost.

Groundwater Recovery Program of 1991

The Groundwater Recovery Program (GRP) was created in 1991 and is designed to support locally developed projects recovering contaminated groundwater in a manner that improves water supply reliability for municipal and domestic use in Southern California. The GRP encourages local agency development of degraded groundwater resources through financial assistance of up to \$250 per acre-foot. Contributions are adjusted annually to reflect project costs that exceed Metropolitan's noninterruptible water rate. Clean-up of existing contamination is not an objective, however, the GRP is expected to provide significant incidental clean-up benefits. The program is similar to the LPP.

This program is open to all technologies which develop and use contaminated groundwater. To qualify, a project must meet the following criteria:

- 1) Contaminated Groundwater - The project must recover groundwater that is considered contaminated under existing California health standards.
- 2) Project Costs - Project costs must exceed Metropolitan's current noninterruptible water rate.
- 3) Location of Water Service - Product water must be used in Metropolitan's service area. Groundwater may be pumped from outside the service area.
- 4) Groundwater Production Rates - Participating agencies must increase their annual groundwater production rates by the stated project yield.

- 5) Three Years of Sustained Production - Each project considered for this program must be able to sustain production during a three-year shortage period without receiving replenishment service from Metropolitan. Failure to do so results in forfeiture of assistance. Under certain circumstances such as operating in a small basin, a two-year period would be proposed for consideration by the Board.
- 6) Sound Basin Management - Agencies must demonstrate that projects are consistent with sound basin management.
- 7) California Environmental Quality Act (CEQA) - Projects must comply with the provisions of CEQA before the Board can approve GRP participation.
- 8) Participation Limits - Each member agency is limited to the greater of: 5,000 acre-feet per year; or 10% of the agency's total annual consumer demand.

The GRP contribution procedure is specifically designed to encourage agencies to develop and operate their projects with maximum efficiency to minimize Metropolitan's financial burden of improving regional water reliability. Metropolitan's contribution rate is expected to diminish in future years as its water rate increases. Once Metropolitan's contribution reaches zero, the agency benefits from accrued savings when project water costs less than purchasing Metropolitan service. On the other hand, agencies will pay more than Metropolitan service rates when project costs exceed the maximum contribution rate. This feature is expected to automatically motivate efficiency in design and operation of agency projects. Metropolitan estimates the program will cost a maximum of \$30 to \$40 million per year.

IMPACT OF WATER MANAGEMENT PROGRAMS

Metropolitan's water management programs have been very popular with both the Board and its member agencies. In total, however, the programs have had a negative effect on Metropolitan revenues. The programs provide opportunities for member agencies to either purchase water at a discount or obtain subsidies for their own water projects. The decline in average revenue per unit of sales shown in Figure 2 demonstrates the cumulative impact of the programs. From 1987 through 1991, the average annual revenue Metropolitan received from an acre-foot of water decreased each year. This was during a period of no rate increases. The decrease was about ten percent (10%).

Projections by Metropolitan indicate continued outlays for its various water management programs. By 2010, these programs are estimated to cost over \$150 million annually excluding the seasonal storage program. Since the programs are funded from water rates, rates will need to be increased to pay for these programs.

The impact of the seasonal storage program is presented in more detail in a later section of this report. In general, the following recommendations are made regarding the water management programs:

- The objective of each program should be reevaluated.
- The success of each program in achieving its objectives should be analyzed.
- Program incentives should not be increased until after a reevaluation is completed. The long term impact on water rates of any increases in incentives should be part of such evaluations.
- The potential use of dedicated funding sources should be investigated for each incentive program.
- The level of incentives may need to be decreased as water rates increase to levels at which the alternative programs the incentives are designed to assist become economically feasible on their own.

INFLATION ADJUSTED COST OF WATER

Figure 2 also presents the average price of water adjusted for inflation. The average price is adjusted using the Consumer Price Index for all urban wage earners for the Los Angeles area. Calendar year 1971 is used as the base year. Although Metropolitan has incurred increased costs for treatment, storage, and delivery as well as payments to the State for the State Water Project over the last two decades, the figure shows that Metropolitan's average revenue in 1991 is only about \$15 per acre-foot more than 1971. It can be concluded from the figure that water has remained a low cost commodity.

WATER DEMAND AND SUPPLY

OBJECTIVE AND PURPOSE

Metropolitan has experienced both short term and long term variations in water deliveries since the beginning of its operations. These variations complicate Metropolitan's task matching supplies and demands in its service area while maintaining an equitable and consistent pricing structure.

In this portion of the study, data on Metropolitan's water sales to its member agencies was collected and reviewed to evaluate the variability of Metropolitan water demands. Also, the forecasting models currently used by Metropolitan were reviewed and evaluated for their appropriateness in forecasting future demands as well as their success in predicting variations in demands and supplies. Where appropriate, recommendations are provided to increase the accuracy of those predictions.

DATA SOURCES

To gain an understanding of the variability of Metropolitan's water demands, information on historical monthly deliveries for July 1981 through January 1992 was reviewed. These deliveries are divided into six different classes of deliveries. The classes of deliveries include:

- Domestic Non-Interruptible (Treated and Untreated)
- In-Lieu Groundwater, Reservoir Interruptible and Reservoir Seasonal Storage
- Agricultural Interruptible
- Direct Groundwater Replenishment
- Local Projects
- Sea Water Barrier Interruptible

Population estimates by member agency and monthly rainfall totals and monthly average daily temperatures at the Los Angeles Civic Center were also reviewed.

CHARACTERIZATION OF METROPOLITAN'S DEMANDS AND SUPPLIES

Characterization of Demands on Metropolitan

The Metropolitan Water District of Southern California is a state chartered organization formed to import water from the Colorado River to supplement insufficient local supplies. The drought of the 1920's and early 1930's firmly established the need for imported water supplies. Metropolitan, in its early years,

experienced low demand for imported water due to the wet years in the late 1930's and early 1940's. The dryer years of the 1950's and early 1960's increased demands, and the population growth further increased the demand for imported water. In response to this and other needs throughout California, the State undertook the State Water Project. Metropolitan became one of many original contractors of the State Water Project.

Metropolitan's primary purpose under the MWD act is to develop, store and distribute water at wholesale rates for domestic and municipal purposes to its member public agencies. Metropolitan is composed of 27 member agencies, including 14 cities, 12 municipal water districts, and one county water authority.

As a water wholesaler, Metropolitan supplies treated and untreated water directly to its member agencies. Metropolitan's 27 member agencies deliver a combination of local groundwater, local surface water, and local reclaimed water as well as water obtained through Metropolitan to their respective customers. For some member agencies, Metropolitan supplies all their water, while others obtain water from Metropolitan to augment their local supplies. On average, Metropolitan supplies about 55 percent of the water supply needs of its service area. Most local agencies usually prefer to utilize their own local supplies as the first alternative. This preference is because the local supplies are sometimes cheaper or because it is more economical for the local agency to maintain constant demand on their production facilities.

Those factors make it difficult for Metropolitan to accurately predict water demands. To forecast water demands, Metropolitan uses a three stage process. The three stages are:

- Estimate the total demand for water in all of Metropolitan's service area.
- Estimate the local supplies which local member agencies will use to meet demand.
- Calculate the difference between total demand and local supplies to determine the demand which must be met by Metropolitan.

Each stage includes a number of steps. For example, to estimate the total demand in each service area, the following factors are considered:

- Population trends
- Per capita usage including the effects of changes in population density, lifestyle, and income levels within each service area
- Mix of end-use customers
- Changes in water use patterns such as increased water conservation

Characterization of Metropolitan's Supplies

Metropolitan obtains its water supplies from two sources, the Colorado River and the State Water Project.

The Colorado River. Metropolitan has water delivery contracts for Colorado River water with the U.S. Department of the Interior for 1,212,000 acre-feet per year (AFY) and an additional 180,000 AFY of surplus water. However, as a result of the 1964 U.S. Supreme Court decision in Arizona v. California, Metropolitan's dependable water supply of Colorado River water is limited to 550,000 AFY. This reduction of supply became effective with the beginning of Colorado River water deliveries to the Central Arizona Project.

Although Metropolitan has a priority to divert 550,000 AFY of California's basic allotment of 4,400,000 AFY, current water use by owners of present perfected rights such as Indian Reservations, towns and other individuals along the Colorado River whose rights predate Metropolitan's rights could reduce the dependable diversions by 30,000 AFY. Conveyance losses along the Colorado River Aqueduct could reduce dependable diversions another 10,000 AFY. Considering these reductions, Metropolitan can obtain 510,000 AFY on a dependable basis.

Under agreements with Coachella Valley Water District (CVWD) and the Desert Water Agency (DWA), Metropolitan exchanges Colorado River water for CVWD's and DWA's State Water Project entitlements. Through a third agreement, Metropolitan delivers Colorado River water in advance to CVWD and DWA for groundwater storage. During periods of peak demand, Metropolitan is able to deliver its full Colorado River supply augmented by a maximum of 61,200 AFY of CVWD's and DWA's State Water Project entitlements.

Implementation of a water conservation program with Imperial Irrigation District (IID), the largest agricultural user of Colorado River water, began in January 1990. In brief, the IID agreement provides for Metropolitan to finance the cost of specific conservation efforts. In return, Metropolitan will be entitled to divert from the Colorado River, or store in a reservoir, a quantity of water equal to the amount of water saved by these projects. The amount of water which will be saved following full implementation is estimated to total 106,110 AFY.

Metropolitan's ability to divert additional water beyond 616,110 AFY, provided through existing agreements, will depend upon hydrological conditions in the Colorado River Basin and the demand for water by other users such as California agricultural agencies and the states of Arizona and Nevada which also hold rights to Colorado River water.

State Water Project Supplies. Metropolitan has contracts with the State Water Project for the delivery of 2,010,000 AFY. However, the State Water Project is currently able to provide a dependable supply equal to about one-half of the amount the state is contacted to deliver. The dependable supply is defined as the amount of

water that is expected to be available during a repeat of the seven year dry period which occurred from 1928 to 1934.

The initial facilities of the State Water Project which include Oroville Dam, San Luis Dam, California Aqueduct and associated pumping plants were completed in the early 1970's. It was expected that additional facilities to increase the yield would be constructed. However, there have been no recent additions to the project. It is anticipated that political and environmental constraints will make any further additions very difficult.

CURRENT FORECASTING APPROACH

Metropolitan has written several reports on the models and methods used to predict future supply and demands. Reviews of the major reports are presented in the following sections.

"Municipal and Industrial Water Use in the Metropolitan Water District Service Area; Interim Report No. 4"

This report was prepared by Planning and Management Consultants Ltd, in June 1991. It outlines the methodology used in developing water demand forecasts for the Metropolitan service area. The forecasts are developed using the MWD-MAIN (Metropolitan Water District-Municipal And Industrial Needs) Water Use Forecasting System. The system provides estimates of water use for the 1990 to 2010 planning period.

The MWD-MAIN program is derived from the IWR-MAIN computerized water use forecasting system. This model developed by the U.S. Army Corps of Engineers' Institute for Water Resources (IWR) is based upon the findings of a comprehensive water use study conducted at the Johns Hopkins University. The MAIN system approach for forecasting water use is to disaggregate water use into major urban sectors and to identify explanatory factors which predict water use within each sector. MWD-MAIN includes additional determinants of water use which were not included in IWR-MAIN and includes parameters for estimating conservation effectiveness which are specific to the water use patterns in Southern California.

There are many factors which combine to influence the demand for water. Some of these factors affect long term demand for water, while other affect only short term demands. Factors affecting long term demands include standard of living, number of persons per household, type of housing, amount and type of landscaping, type of appliances used, type of plumbing fixtures used, and number of swimming pools. Factors affecting short usage include household income, water price and rate structure, conservation practices, and weather.

To use MWD-MAIN, the relationship between the factors listed above and water demand in a certain area must be calibrated. Data on water use by customer categories is collected from fourteen Metropolitan retail member agencies.

The MWD-MAIN model also requires the geographical study areas which collectively make-up Metropolitan's service area be defined. A total of fifty-seven study areas were defined. This geographic disaggregation permits consideration of different pricing policies, socio-economic characteristics, conservation activities, and growth trends within the region. For each county, a major proportion of the population served was accounted for by the selected urban clusters.

To use the MWD-MAIN model, values of variables explaining water use must be provided for both a base year and the forecast years. Projections of growth as well as future socio-economic conditions are required. The MWD-MAIN model can accept the growth projections as values projected externally by other studies or can project future values based on its own internal growth models. For the development of water use forecasts for Metropolitan's service area, a combination of external projections and internal growth models are used.

Metropolitan has selected calendar year 1980 as the base year for forecasting water use. Calendar year 1980 was chosen for the base year because it is the most recent year for which all required disaggregate socioeconomic data is available. Selected input data for each study area were collect for each year. For this purpose, Metropolitan used such sources as the Southern California Association of Governments (SCAG) and the San Diego Association of Governments (SANDAG).

"Agricultural Water Use in Metropolitan Service Area". Report No. 1018

This report was prepared by Metropolitan's Planning Division in October, 1990. It evaluated current agricultural water use trends and projects agricultural water use within Metropolitan's service area under normal or average weather conditions. The determination of future agricultural water use is important because of its affect on regional demands.

This report evaluates agricultural usage on a county basis. Each chapter analyzes historical, present, and future agricultural activities, the quantity of water used, the source of the water supply, the acreage by crop, and the value of the crop. The crop acreage and value was taken from the 1988 county crop reports.

This report identified two primary factors affecting the amount of agricultural activity in Metropolitan's service area. The factors are the economic viability for continued agricultural production and the pressures for urbanization in the agricultural areas. The second of these two factors was used in this report to predict agricultural water usage. The resulting estimates of future agricultural water use considered urbanization pressures, trends in water use, and a subjective assessment of agricultural conditions. In some cases, member agencies had prepared their own reports on future agricultural water use. Since these agencies are most familiar with local conditions, their assessments were incorporated into the report.

To predict future housing development, information from the regional planning agencies was used. Agencies such as SCAG have developed population and housing projections at the census tract level. When development occurs in irrigated areas,

the reduction in agricultural water use is calculated by taking the irrigated area lost to development and multiplying by a crop water duty factor.

In areas where future agricultural water use could not be determined by factoring projected increases in housing units, a projection was made by reviewing historic agricultural water use patterns and extrapolating those patterns into the future. This methodology was chiefly used where development was expected to occur in both irrigated and non-irrigated lands.

Lastly, in areas where little data existed, planning assumptions were made about the amount of development pressure and the economic viability of agriculture in the area. These assumptions were made based on discussions with member agencies in the area.

This report concludes that in the year 2010 only seven percent (7%) of total regional use will be for agriculture which represents only five percent (5%) of Metropolitan's deliveries. This compares to ten percent (10%) of total regional use at the present time and ten percent (10%) of Metropolitan's deliveries. Since these levels of demands are relatively small by comparison with the municipal and industrial demands, the level of accuracy required in predicting future agricultural water use, is not as critical as in determining future municipal and industrial demands.

"The Regional Urban Water Management Plan for the Metropolitan Water District of Southern California"

This report was prepared by Planning and Management Consultants Ltd for Metropolitan in November, 1990. It was prepared in response to the Urban Water Management Planning Act which required every urban water supplier providing water for more than 3,000 customers or supplying more than 3,000 acre-feet of water annually to prepare and adopt an urban water management plan. Metropolitan prepared an initial plan in July, 1985 and a revised plan in 1990.

The Urban Water Management Plan reviews current and projected water use, water supplies, and management plans for balancing future demands and supplies. Included as part of the management plans are water reclamation, drought action plans, water exchange agreements, water conservation measures, and possible new sources of water rights. The report reviewed water supplies and demands to the year 2010.

This report includes the same information on water use as was presented in the reports, "Municipal and Industrial Water Use in the Metropolitan Water District Service Area" and "Agricultural Water Use in Metropolitan's Service Area".

The Urban Water Management Plan reviews potential water sources to the Year 2010. Local supplies account for about 35 percent of the Metropolitan service area water needs. Since most local water supply sources are completely developed within the service area, there is little opportunity for increases in local water supplies. The only exception is water reclamation. The report concludes increased supply from this

source will be limited by costs and regulatory issues regarding the use of reclaimed water. Even with these limitations, reclaimed water use is expected to double from current use by 2010. One possible area of reduced supply is groundwater. Groundwater supplies make up about 90 percent of the natural local supplies. Major groundwater basins are showing trace amounts of organic chemicals. The Urban Water Management Plan estimates that about 74,000 AFY of historic groundwater production have been lost because of high mineral concentrations, primarily nitrates and total dissolved solids, since the 1930's. Compounding this concern is the future water quality regulations which are expected to reduce the acceptable levels of contaminants. The Urban Water Management Plan assumes that water quality problems will not affect the long-term availability of groundwater, since there are efforts underway to reverse degradation of the groundwater basins.

Most of Metropolitan's member agencies rely on imported water for part of their water supply. Imported water is obtained from three major sources. First, the City of Los Angeles imports water from the Owens Valley and Mono Basin through the Los Angeles Aqueduct. Second, the City purchases water which Metropolitan obtains from the State Project. Finally, the City purchases water which Metropolitan obtains from the Colorado River.

It is unlikely that water deliveries from these three sources will continue at their historic levels. Litigation over water diversion in Mono Basin has forced the City to reduce the amount of water diverted. Historically, California has been able to take more than its allotment from the Colorado River. As other states develop facilities to withdraw their full allotments from the river, less water will be available to California for diversion. The State Water Project first provided water to Metropolitan in 1972. Presently, it is supplying a dependable supply of only about one half of the amount the State contracted to deliver. The remainder of the project has been delayed or halted due to environmental concerns and political reasons.

The report identifies potential new supplies. These new sources are still delivered via the three aqueducts listed above, only they involve new agreements or water rights purchases from these three sources.

The Urban Water Management Plan concentrates on possible demand reductions. The Plan identifies current and potential water conservation measures. As a part of its conservation program, Metropolitan has identified a number of Best Management Practices (BMP) most of which will be implemented by the year 2000 if they are determined to be technically, economically, and socially feasible. These practices include retrofitting existing residences with low flow shower heads and toilets, water audits, and revisions to the water code. Metropolitan expects that conservation will increase from a rate of 7.4% of total municipal and industrial demand in 1990 to a rate of 11.4% in the year 2010. However, these savings are expected to be offset by increases in water use due to demographic changes, such as household size, increasing standard of living, and increased population in the hotter parts of the service area.

"Statistical Analysis of Water Demands During the Current Drought" (1989) by Thomas Chestnutt and Casey McSpadden

The second model used by Metropolitan to predict Municipal and Industrial demands was developed by Thomas Chestnutt and Casey McSpadden. This model has been called MWD-FORE. This model forecasts total monthly water demand in Metropolitan's service area. In particular, the model includes:

- A trend component for long term growth,
- A seasonal component to capture the pattern of water use through the year,
- A climatic component to show the effect of departures from normal weather patterns, and
- An error component which accounts for nonsystematic forces affecting water use.

The model generates forecasts of water demand reflecting the historical relationship between water demand, population and climate from 1975 through 1987. Therefore, the model's predicted demand levels do not include any post 1987 conservation effects. The model can also generate water use forecasts under different climatic scenarios. These scenarios can be normal weather, hot dry weather, and cool and wet weather, providing a range of water demands in the region. This information is useful for supply reliability analysis.

EVALUATION OF CURRENT FORECASTING METHODS

"Municipal and Industrial Water Use in the Metropolitan Water District Service Area; Interim Report No. 4"

Any attempt to predict future growth trends is difficult. Clearly, no model could ever take into account all the factors which could affect the future demand for water; however, the following might help to further increase the accuracy of the model.

The model uses a host of sub-areas to create the total model. It would be beneficial to have these sub-areas more closely related to the geographical boundaries of Metropolitan's water retailing member agencies. This would be particularly useful when calibrating historical water uses to the model results.

The level of accuracy of predictions regarding future demands is partially dependant on the amount of historical data available. Clearly, the areas with the largest amount of historical information available will be the areas that have been established the longest. However, it is the least established areas that are likely to experience the largest rate of growth. It may be necessary to collect more information regarding

future growth rates in the newer areas of Metropolitan's service area, such as Riverside and southern Orange County.

Finally, the model uses an assumed use per employee to project commercial and industrial demands. Additional parameters should be investigated for predicting demands for these sectors.

"Agricultural Water Use in Metropolitan Service Area". Report No. 1018

The report's accuracy is largely dependent on the accuracy of the projections for Riverside County and San Diego County, since these two counties accounted for 76% of the agricultural water demands in Metropolitan's service area for 1989. Of the two counties, Riverside county is the largest, accounting for 46% of the agricultural demand in 1989.

Population and housing projections for western Riverside County were obtained from the 1990 Population and Housing Forecast Update for western Riverside County, A Summary Report prepared by P&D Technologies. Individual projections were developed for 26 analysis units within the study area, thereby providing detailed information on the growth patterns in the study area.

In San Diego County, the report relies on the "Water Distribution Study-1987" by the San Diego Water Authority (SDCWA). The findings of this report were based on information provided to the SDCWA by its member agencies.

Considering the large areas involved in a study of this nature and the complex issues involved in trying to predict the future levels of urban growth and changes in the economic of agricultural production, the Report No. 1018 has done a good job of collecting and presenting the available information.

"The Regional Urban Water Management Plan for the Metropolitan Water District of Southern California"

This report covers many issues, but is not a review of any particular forecasting method. None the less, it does address issues that could be further quantified.

First, the assumptions and calculations behind the increases in water conservation are not explained. An improvement would be to have a probabilistic type of table for anticipated conservation levels.

Similarly, the various plans for obtaining increased supplies through exchanges and buyouts of water rights are not fully developed. These could be tabulated against probabilities of success.

"Statistical Analysis of Water Demands During the Current Drought" (1989) by Thomas Chestnutt and Casey McSpadden

The MWD-FORE model described in this report is a very complex statistical analysis of past demand trends. It therefore represents a "state of the art" approach to statistical prediction of future demands. However, its limitations are similar to those for the MWD-MAIN model. It gives upper and lower bound values by considering wet/cool and hot/dry events. The model is valuable for setting expected ranges for normal demands.

METROPOLITAN'S DEMAND VARIABILITY

Evaluation of Historical Deliveries

In order to understand the variability of Metropolitan's water demands, historical monthly deliveries for the period of July 1981 through January 1992 were obtained from Metropolitan. These deliveries were divided into six different classes of deliveries.

- Domestic Non-Interruptible
- In-Lieu Groundwater, Reservoir Interruptible and Reservoir Seasonal Storage
- Agricultural Interruptible
- Direct Groundwater Replenishment
- Local Projects
- Sea Water Barrier Interruptible.

Other data included population estimates by member agency for Metropolitan's service area and monthly rainfall totals and monthly average daily temperatures at the Los Angeles Civic Center. The data received for total deliveries to all member agencies is shown in Figure 3. Only five delivery classes are shown on this figure, with Local Projects deliveries which are a very small portion of total deliveries being excluded. Furthermore, they actually represent a financial transaction from Metropolitan to member agencies to encourage an increase in local supplies and they do not represent an actual water deliveries.

Deliveries increased steadily between 1982 and the end of 1990. In early 1991, these deliveries dropped dramatically, in contrast to the trend in previous years. Metropolitan deliveries were compared against other data to find a relationship between deliveries and explanatory factors. Deliveries were plotted against population, average monthly temperatures, and total monthly rainfall.

HISTORICAL DELIVERIES

Total Deliveries to All Member Agencies

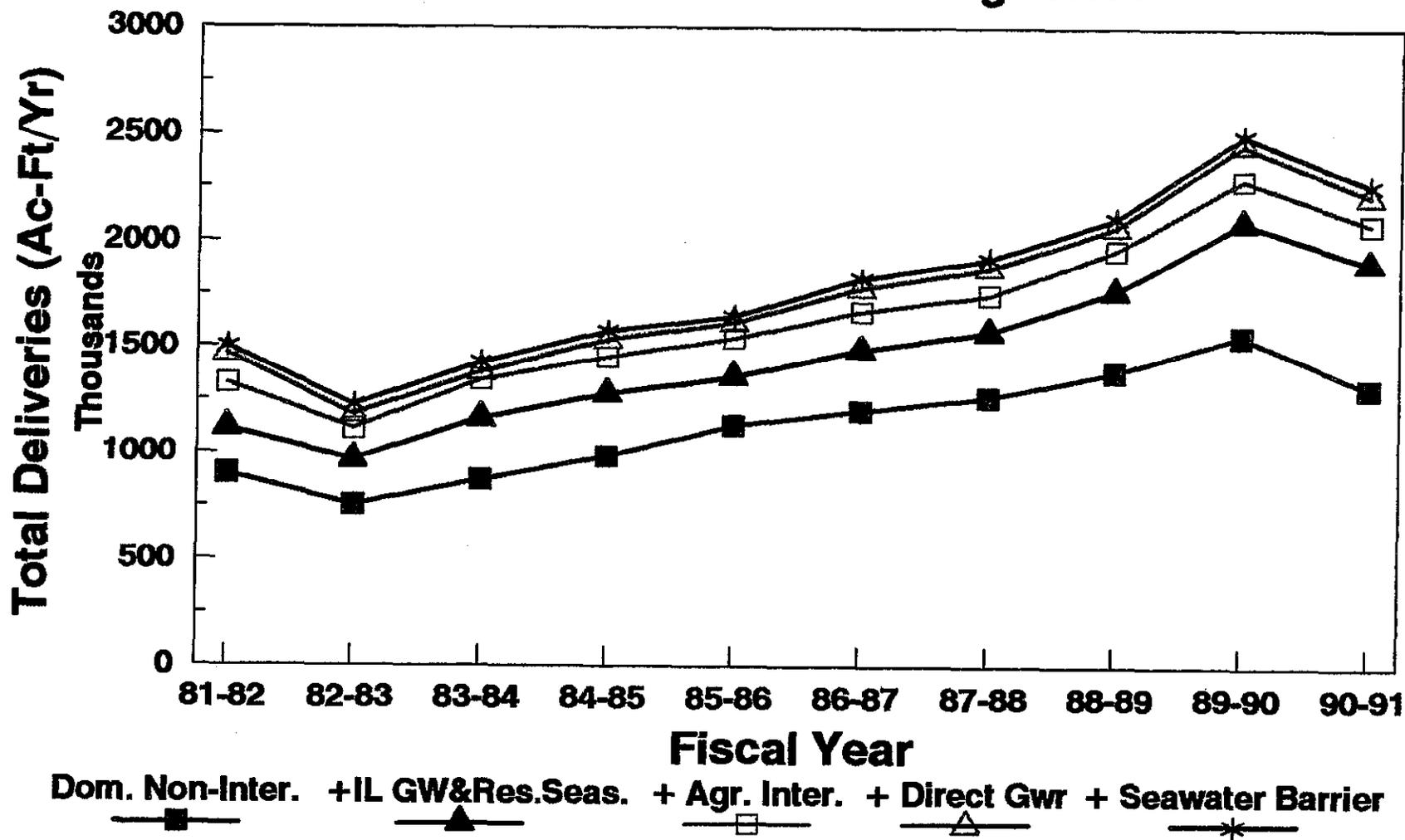


FIGURE 3

The strongest long term relationship found was between the total monthly rainfall measured at Los Angeles Civic Center and the total deliveries. In Figure 4, these values have been plotted. Rainfall showed a falling trend between 1982 and 1990, while the demands showed an increasing trend over this period. The sudden drop in deliveries to member agencies in early 1991 is caused by Metropolitan implementing restrictions under the IICP and public awareness of the need to conserve due to the drought that began in 1987.

Factors Limiting Metropolitan's Water Sales

Two mechanisms combine to define the amount of water that Metropolitan will be able to deliver in any given situation. During normal or wet years, Metropolitan is limited by the amount of water that member agencies are willing to purchase. In those years, Metropolitan has sufficient supplies available to meet all the demands made by its member agencies. In this situation, it would be expected that there is a strong negative correlation between rainfall and the demand for water deliveries from Metropolitan. Normal or above normal rainfall increases local supplies, reduces local demands, and reduces the demand for water deliveries from Metropolitan. In these years, the sales by Metropolitan are limited by demand only.

However, during drought years, Metropolitan is not able to meet demands due to limitations on supplies. If population growth and its associated increases in demands for water continues to increase, these types of supply driven limitations may become more prevalent unless additional sources of supply are obtained. In these years, sales by Metropolitan will be limited by supply, and not demand as has generally been the case historically.

Prediction of Future Sales

Traditionally, the amount of water that Metropolitan has been able to sell has been limited by the amount of demand for imported water. For this reason, the Metropolitan supply planning process has placed as a first priority the prediction of demands and local supplies within its service area. This demand can be divided into two categories, Municipal and Industrial Demands, and Agricultural demands. These two sets of demands are estimated for the complete Metropolitan service area. Once these two demands have been predicted and combined to form a total demand, estimates of local supply and imported Los Angeles aqueduct supply are subtracted to yield the demand which is to be met by Metropolitan. Metropolitan can then plan on meeting this demand from either the Colorado River or the State Water Project.

Prediction of Future Demands

The methods currently used by Metropolitan represent a "state of the art" approach to forecasting of normal demands. However, these forecasting procedures only yield the normal demands that can be expected for a given year in the future. The data presented earlier demonstrates that demands for a given year will vary depending on

ANNUAL RAINFALL VS ANNUAL DELIVERIES

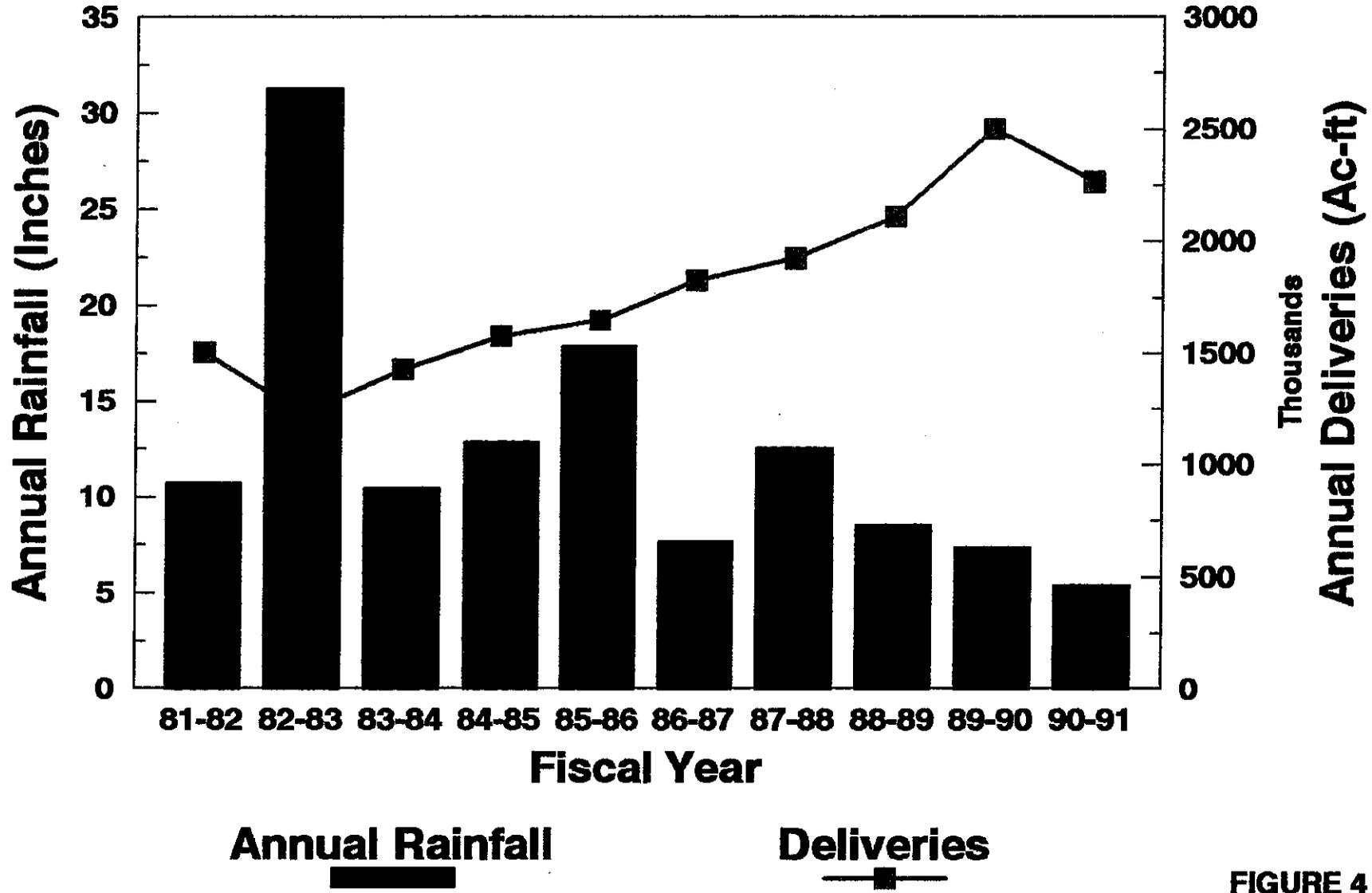


FIGURE 4

the weather patterns that actually occur for that year. There is no known way of accurately predicting future weather, either in the short term or the long term. So despite these complex demand prediction models, there is still a need to estimate the percentage of time Metropolitan can expect a certain level of demand. The model by Chestnutt and McSpadden is a good basis for the development of a set of statistical confidence intervals for demands. This is valuable in predicting a range of demand levels for a particular year.

A review of the methods used by Metropolitan to estimate future local supply levels for individual member agencies was beyond the scope of this report. Such supplies have tended to be fairly stable, with some exceptions. The major exception recently has been the Los Angeles Aqueduct, where the City of Los Angeles lost a significant portion of its supplies when the withdrawals from Mono Lake were limited by court action. There are possible future factors which may affect local supplies such as degradation of local groundwater quality. To date, the groundwater basin safe yields have already been limited by water quality deterioration, and this could accelerate in the future if legislation affecting water quality is tightened and if degradation continues. On the positive side, future projects involving water reclamation will increase the water supply available and increases in water conservation above those levels already predicted will lead to decreased local demands.

Prediction of Limits on Imported Supplies

During the recent drought, supplies were unable to meet demands and Metropolitan was forced to implement water rationing. This not only reduced demands to available supply levels but also led to an inevitable reduction in revenue for Metropolitan.

Metropolitan is now faced with the need to accurately estimate supply levels as well as levels of demands. Metropolitan obtains its water from two sources, and the future supplies from each of the sources will need to be estimated in order to accurately predict supplies.

Prediction of State Water Project Supplies. Prediction of future supply levels is a complex issue, particularly when dealing with the State Water Project. The amount of water available from the Delta depends on many factors. The most obvious relationship is between the flows through the Delta and the hydrology of the State Project catchment area. In periods of drought in the State Project catchment area, flows through the Delta are limited and pumping from the Delta is consequentially limited. There are a series of criteria which are used to determine how much can be pumped from the Delta once the flow through the Delta is known. However, these criteria are, and will probably continue to be in a state of flux, as environmentalists, agricultural water interests, and southern Californian water interests all compete for different management criteria for operation of the Delta.

The hydrology of the State Project catchment is well documented, and the Department of Water resources has models that predict the flows available for

historical weather years given certain levels of Delta improvements. However, since no one can predict the weather, no one can predict supplies for a given year except by estimating these on a probabilistic basis.

In predicting future supplies from the State Water Project, it is important that the possible effects of the various proposed changes to the system be incorporated and added by some means to the estimates for future years.

Prediction of Colorado River Supplies. The supply situation from the Colorado River is much more easily predicted than from the State Water Project. This is because the Colorado River is a very large system, with a large catchment area. This tends to reduce the effects of local drought years, and also because the Colorado River has many large reservoirs on its length, that allows for the balancing out of short term effects.

With regard to short term predictions, each spring the U.S. Bureau of Reclamation convenes meetings of the Colorado River Management Work Group to develop and recommend an annual operating plan for the Colorado River system reservoirs for the following October 1 to September 30. Beyond this, Metropolitan can forecast Colorado River reservoir system operations using its 24 month reservoir operations planning model. For long term projections, it should be possible to establish relationships between flow levels and their probability of occurrence.

Metropolitan has several programs to increase supplies from the Colorado River, such as:

- A program to deliver Colorado River water in advance to Coachella Valley Water District and Desert Water Agency in exchange for their State Project water.
- An arrangement to reimburse Coachella Valley Water District for the cost of water conserved through the lining of the first 49 miles of the Coachella Branch of the All American Canal, which is then made available to Metropolitan.
- Implementation of a water conservation program in cooperation with Imperial Irrigation District to conserve 106,110 acre-feet per year.
- Implementation of a land fallowing agreement with the Palos Verde Irrigation District.
- Implementation of a groundwater banking program and escrow accounts with various entities.

When predicting future Colorado River supplies, it will be important to predict the probability of these projects being successfully completed by a certain year, so that they can be included in the calculation of the probable supplies.

RECOMMENDATIONS

Use of a Probability Matrix for Estimation of Future Supply and Demand Levels

The term "probability matrix" refers to the process of assigning probabilities of success to a certain outcome for each year under consideration, and then multiplying this matrix of probabilities by the possible rewards of the outcomes (possible increases or decreases in supplies) to obtain a weighted, expected supply. It is important to remember that this expected supply is still a "best guess" value, and the actual value will vary from this depending on external factors such as the weather.

An expected value approach combines possible scenarios that to date have usually been handled separately. When this process is carried out for a series of years, the total for the series of years will be more accurate because the effects of random events such as weather variations will cancel each other out. While this does not help to exactly predict supplies for a given year, it does predict the long term supply amounts. The rate system can be structured so that shortfalls in revenues caused by extreme dry/hot events (supply shortfalls) and the wet/cool events (demand shortfalls) are balanced by accumulated reserves.

The Use of a Mass Diagram Approach to Sizing a Working Capital Reserve Fund

While it is not within the scope of this report to produce a complex model for use in sizing a component of working capital, an attempt has been made to outline the basic procedure that could be used in sizing such a reserve fund. This process is essentially similar to the process used when reservoir capacity is being sized using a mass diagram.

First, a long period of historic weather data will be required for the State Water Project catchment, the Colorado River catchment, and for Metropolitan's service area. A period of data such as the 57 year period currently being used for the State Water Project would be appropriate. Using this data, maximum supply levels are calculated for the State Water Project and the Colorado River Aqueduct using the DWR-SIM and CRSS computer models respectively, for each year of weather data, assuming projected levels of infrastructure development. The demands on Metropolitan service area less the local supplies need to be projected. The projected water sales volumes for Metropolitan in a model year are the lesser of the demands on Metropolitan or supplies from the State Water Project and the Colorado River. These volumes can be converted to dollar amounts at current rates.

These sales values are then accumulated and plotted on a graph versus time in years. This is called the mass curve. The target average sales amount per year is then calculated by drawing a straight line between the origin of the graph and the final data point. The maximum expected size of a Working Capital Reserve Fund component to protect against sales shortfall is the largest vertical distance between the straight line and the mass curve. A Mass diagram typically looks like the graph on Figure 5.

EXAMPLE MASS DIAGRAM

For Sizing Working Capital Requirement

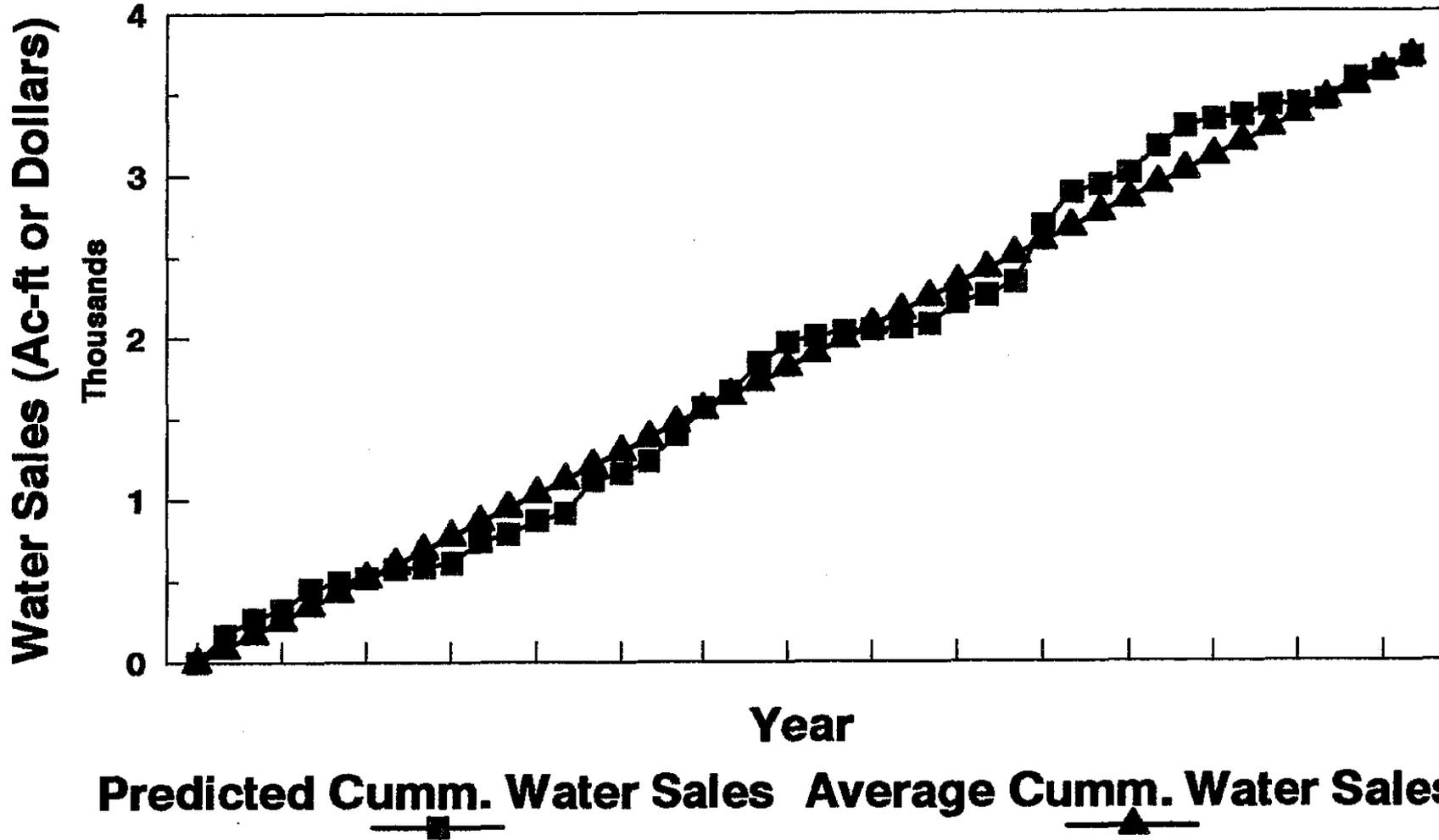


FIGURE 5

For a more complete projection of the long term sizing of this component of the Working Capital Reserve Fund, the period of data can be synthesized, or the data period (such as the 57 year data period used on the State Water Project) can be re-used over and over again, with the data values being randomly re-organized in different orders to simulate different types of historical weather data. As this data is re-run in different orders, the new values calculated for the expected annual sales (the slope of the straight line on Figure 5) can be tabulated and a value chosen that represents a confidence level acceptable to Metropolitan.

Preliminary Sizing of the Working Capital Reserve Fund

If the procedures that have been recommended in the preceding sections are adopted, they can provide accurate estimates of the size of sales swings which should be covered by a portion of working capital reserves. However, until these studies are completed, it is necessary to make a best estimate of the size of such a reserve based on demand information available.

Table 5 presents an approach to predicting service area water demands based on population projections and per capita demands. Local supplies and LA Aqueduct imports are based on historical data. An estimate of expected variability in water sales (difference between predicted and actual sales) is presented in this table. This method provides an estimate of the cumulative shortfalls and excess sales that could be expected in the future, based on past history. The figures for total per capita demand have stayed very constant over the thirty year period. Since there has been so little variation, future total demands can be predicted with confidence using the average value for this historical period. Local supplies, excluding Los Angeles Aqueduct, have shown a slight increasing trend, and for the purposes of prediction, a line of best fit was found and used. Los Angeles Aqueduct values have changed significantly over the period, with the last few years having very low values. However, for the purposes of this exercise, it was assumed that over the long term the Los Angeles aqueduct deliveries for the period 1969 through 1991 were constant at their average value.

Based on these values, predictions were compared to the actual values for the period 1969 through 1991. These results are shown in Figure 6. In the periods where actual Metropolitan sales are greater than predicted, Metropolitan would have an excess of sales, and would build up working capital reserves. In periods where actual sales are less than the predicted sales, the funds in the working capital reserves would be used to make up for these shortfalls. These values are also shown in Table 5.

The model shows that the largest cumulative shortfall in sales, over 700,000 acre-feet, occurred from 1982 to 1986. The largest one year shortfall of 335,455 occurred in 1983. It would be reasonable to size the sales shortfall component of a Working Capital Reserve Fund at a level between those two points. For this study, a value of 500,000 acre-feet has been used.

Table 5

Comparison of Actual Demands versus Projected Demands

FISCAL YEAR ENDING	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)
	TOTAL POP. SERVED	TOTAL PER CAPITA DEMAND	MWD WATER USE PER CAPITA	LOCAL SUPPLIES PER CAPITA	TOTAL SERVICE AREA DEMAND	MWD DEMAND	LOCAL SUPPLIES (E)-(F)	LA AQUEDUCT DELIVERIES	LOCAL SUPPLIES LESS LA AQU. (G)-(H)	TOTAL SERVICE AREA DEMAND FROM POP (3)	BEST FIT LOCAL SUPPLIES LESS LA AQU. (4)	ASSUMED LA AQUEDUCT DELIVERIES (MEAN)	PREDICTED MWD DEMANDS (J)-(K)-(L)	DIFF. (M)-(F)	CUMM DIFF IN SALES SHORT-FALL (AC-F)	CUMM DIFF IN EXCESS SALES (AC-F)
	(1)	(1) (GPCD)	(1) (GPCD)	(1) (GPCD)	(2) (AC-FT/YR)	(2) (AC-FT/YR)	(AC-FT/YR)	(2) (AC-FT/YR)	(AC-FT/YR)	(AC-FT/YR)	(AC-FT/YR)	(AC-FT/YR)	(AC-FT/YR)	(AC-FT)	(AC-F)	(AC-F)
1961	8,238,800	235.4	98.8	135.6	2,172,423	921,019	1,251,404			2,140,861						
1962	8,535,200	218.9	96.2	122.7	2,092,827	919,735	1,173,092			2,217,881						
1963	8,802,400	229.0	102.9	126.1	2,257,930	1,014,590	1,243,341			2,267,313						
1964	9,104,900	233.9	101.0	132.9	2,365,499	1,030,079	1,355,421			2,365,916						
1965	9,364,500	234.3	105.2	129.1	2,457,711	1,103,505	1,354,206			2,433,375						
1966	9,580,100	231.9	97.6	134.3	2,488,540	1,047,355	1,441,186			2,489,399						
1967	9,744,500	225.0	98.7	128.3	2,455,930	1,055,504	1,400,426			2,532,118						
1968	9,919,800	238.5	97.1	141.4	2,650,118	1,078,937	1,571,181			2,577,670						
1969	10,103,700	224.1	92.3	131.8	2,536,274	1,044,614	1,491,660	347,737	1,143,923	2,625,457	1,144,179	416,046	1,065,232	20,617	20,617	0
1970	10,226,600	243.4	101.7	141.7	2,788,212	1,185,001	1,623,211		1,260,789	2,657,393	1,156,583	416,046	1,084,764	(80,237)	0	(80,237)
1971	10,385,600	242.0	98.8	145.2	2,815,275	1,126,110	1,689,165	456,856	1,232,309	2,698,709	1,168,957	416,046	1,113,676	(12,434)	0	(92,671)
1972	10,561,700	252.6	105.5	147.1	2,988,416	1,248,131	1,740,285	468,416	1,271,869	2,744,469	1,181,391	416,046	1,147,032	(101,099)	0	(193,770)
1973	10,733,900	236.1	97.7	138.4	2,838,752	1,174,697	1,664,054	459,843	1,204,411	2,789,215	1,193,795	416,046	1,179,374	4,677	4,677	0
1974	10,902,500	233.4	102.2	131.2	2,850,367	1,248,104	1,602,263	462,835	1,139,428	2,833,026	1,206,199	416,046	1,210,781	(37,323)	0	(37,323)
1975	11,077,100	229.9	107.5	122.4	2,852,587	1,333,854	1,518,733	451,553	1,067,180	2,878,396	1,218,603	416,046	1,243,748	(90,107)	0	(127,430)
1976	11,254,500	244.5	110.4	134.1	3,082,329	1,391,775	1,690,553	467,010	1,223,543	2,924,493	1,231,006	416,046	1,277,441	(114,334)	0	(241,764)
1977	11,432,200	231.1	108.6	122.5	2,959,400	1,390,700	1,568,700	324,805	1,244,095	2,970,669	1,243,410	416,046	1,311,213	(79,467)	0	(321,251)
1978	11,638,700	204.2	91.8	112.4	2,662,160	1,196,799	1,465,361	346,757	1,118,604	3,024,328	1,255,814	416,046	1,352,468	155,670	155,670	0
1979	11,824,000	215.1	93.3	121.8	2,848,910	1,235,720	1,613,190	466,740	1,148,450	3,072,479	1,268,218	416,046	1,388,215	152,495	308,165	0
1980	11,853,500	226.2	95.7	130.5	3,028,737	1,281,389	1,747,348	478,357	1,268,991	3,106,129	1,290,622	416,046	1,409,461	128,073	436,237	0
1981	12,187,600	242.5	107.1	135.4	3,313,294	1,463,315	1,849,980	475,979	1,374,001	3,169,559	1,293,026	416,046	1,460,487	(2,828)	0	(2,828)
1982	12,427,600	232.1	106.0	124.1	3,230,995	1,503,436	1,727,559	461,855	1,265,904	3,229,325	1,305,430	416,046	1,507,849	4,413	4,413	0
1983	12,681,100	212.3	86.3	126.0	3,015,849	1,225,862	1,789,787	481,925	1,307,862	3,295,197	1,317,834	416,046	1,561,317	335,455	339,868	0
1984	12,939,600	232.6	98.4	134.4	3,374,254	1,428,231	1,946,023	506,407	1,441,616	3,362,368	1,330,238	416,046	1,616,085	189,854	529,722	0
1985	13,215,500	236.2	106.4	131.8	3,526,138	1,575,067	1,951,070	510,790	1,440,281	3,434,061	1,342,642	416,046	1,675,374	100,307	630,028	0
1986	13,569,000	234.2	108.4	125.8	3,559,661	1,647,597	1,912,064	481,591	1,430,473	3,525,919	1,355,045	416,046	1,754,827	107,230	737,259	0
1987	13,881,500	236.3	117.4	118.9	3,674,295	1,825,468	1,848,809	477,196	1,371,613	3,607,122	1,367,449	416,046	1,823,627	(1,859)	0	(1,859)
1988	14,220,700	227.7	120.6	107.1	3,627,085	1,921,068	1,706,021	416,182	1,289,839	3,695,264	1,379,853	416,046	1,899,365	(21,701)	0	(23,560)
1989	14,516,400	233.4	129.7	103.7	3,765,191	2,108,882	1,666,210	328,205	1,358,005	3,772,102	1,392,257	416,046	1,963,799	(145,183)	0	(168,743)
1990	14,863,400	240.4	150.2	90.2	4,002,456	2,500,702	1,501,753	205,638	1,295,816	3,862,270	1,404,681	416,046	2,041,563	(459,139)	0	(627,882)
1991	15,210,400		132.9		0	2,263,748		130,355		3,952,438	1,417,065	416,046	2,119,327	(144,421)	0	(772,303)
Mean		232.0	105.3	127.6	2849400.6	1369971.3	1604201.9	416045.8	1268050.1				MAX +VE	335,455	737,259	0
Standard Dev.		9.9	13.1	12.1	709035.0	386978.8	205194.1	95148.6	103865.5				MAX -VE	459,139	0	772,303

33

- (1) - Taken from Table III-8 of MWDSC Report "Water Conservation Pricing of the Metropolitan Water District".
- (2) - Figures provided by Metropolitan Staff from the PIMS system.
- (3) - Calculated from Population (A) multiplied by Mean Per Capita Total Demand.
- (4) - Based on a regression analysis of recorded data.

PREDICTION OF DEMANDS YEARS 1969-1991

34

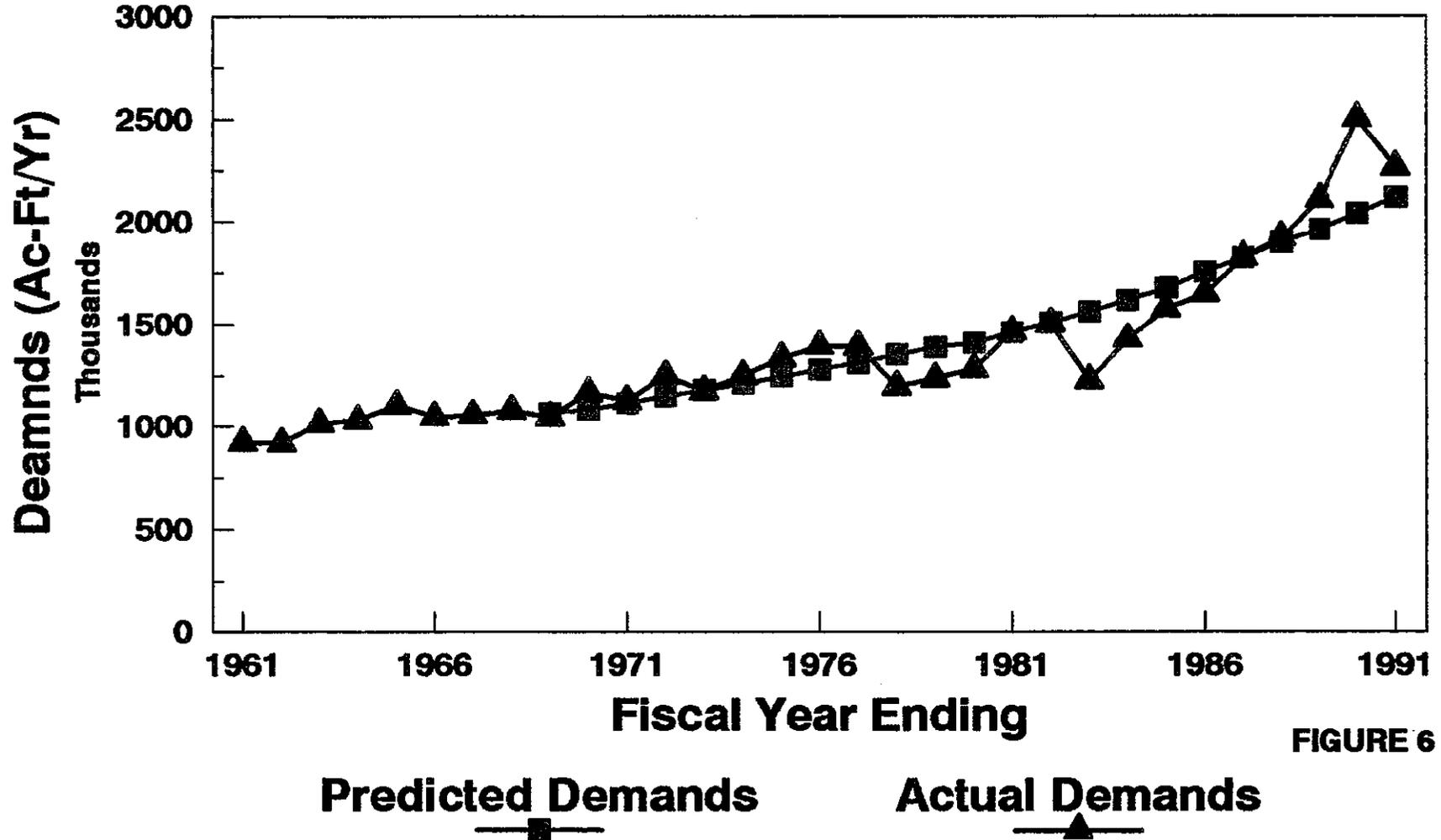


FIGURE 6

REVENUE SOURCES

This section of the report examines a number of revenue issues and evaluates alternative revenue sources available to Metropolitan. Those sources include water rates, taxes, and annexation charges which are currently used; standby and service charges which are being implemented; and connection charges which are proposed herein. Each alternative source is evaluated against seven criteria: equitability, revenue stability, ease of implementation, consistency with current policy, contribution toward conservation, ease of administration and potential for legal challenge.

REVENUE ISSUES

Fixed and Variable Revenue

Fixed revenues are defined as revenues derived from sources which do not vary with the amount of water sold. Variable revenues in comparison, are defined as revenues derived from sources which vary with the amount of water sold. Sources of fixed revenues include taxes, standby charges, and service charges. Fixed sources can also include connection charges, interest earnings, and annexation charges since those do not vary with the amount of water sold. Those revenues can be highly variable, however, since they are dependent upon growth, interest rates, and other factors beyond Metropolitan's control.

In 1940, almost all of Metropolitan's revenue was from a fixed source, namely ad valorem taxes. Since then there has been a steady shift away from taxes towards revenues from water rates as Metropolitan's primary revenue source. Revenues from water sales now account for approximately 70 percent of all of Metropolitan's total revenues.

Metropolitan is engaged in an enterprise activity like many other utility and commercial enterprises. Its costs of providing water service are comprised of fixed and variable components, much like that of its member agencies. At the present time, Metropolitan recovers almost all of its costs through the application of water rates. Thus, it combines fixed and variable costs in pricing the commodity it sells. This approach is the norm in the water industry. Most utilities and most commercial enterprises depend upon the sale of a commodity or service to recover both fixed and variable costs.

From an economic viewpoint, efficient use of resources is obtained when the price for a resource, be it a commodity or service, reflects the total cost of that resource and supply and demand are brought into balance. Thus, maximizing the recovery of costs through water sales helps promote the most efficient use of imported supplies by Metropolitan's member agencies. The State Department of Water Resources, and many public and environmental interest groups, believe water should be priced to reflect its total cost in order to promote efficient use of that resource. In fact, many believe water should be priced at its marginal cost to achieve a more efficient use of a limited resource.

In regulating private water companies, the California Public Utilities Commission has allowed Class C companies (500-2,000 customers) to set service charges to recover up to 50 percent of their fixed costs. While its regulations apply only to privately owned retail water suppliers, the concept has been adopted by generally smaller retail public water agencies endeavoring to stabilize revenues.

Bond rating agencies and bond purchasers prefer a fixed revenue stream over a variable revenue stream because of the added certainty and predictability of fixed revenues. Thus, General Obligation Bonds are traditionally rated higher than Revenue Bonds and have lower interest rates.

It is important to recognize that Metropolitan is a wholesaler of water and not a retailer. Some of its member agencies are in turn also wholesalers, so there may be several agencies between the ultimate retail consumer of water and Metropolitan. Consequently, Metropolitan's pricing policies affect only its 27 member agencies. How its charges to those agencies are in turn passed on to end users (consumers) is not within Metropolitan's control. Metropolitan's pricing policies certainly influence its member agencies, however.

Movement from fixed to variable revenue sources experienced by Metropolitan over the last four decades reflects a common trend in the pricing of utility services. That trend is expected to continue. AB 3214, which is under consideration by the Legislature, would shift some property tax revenues from special enterprise districts to schools reflects this trend. Metropolitan should anticipate that its ability to collect revenue from fixed sources such as taxes and standby charges could be diminished in the future through political action.

In conducting this study, no standard or guideline was found indicating what level of revenue should be derived from fixed versus variable sources for a utility such as Metropolitan. Most major utilities have minimal levels of fixed revenues. Accordingly, the level of fixed revenue is considered a management decision to be made by the Board.

Revenue Stability

Reliance upon fixed revenue sources is not the only means available to gain revenue stability. Revenue diversity, water pricing, and maintenance of adequate reserves are other methods of achieving revenue stability.

While a particular revenue stream may be variable, if several revenue methods are used, total revenues will not be as variable. For example, water sales are influenced by weather and connection charges are influenced by growth. A cool wet year with low water sales could well be a high growth year, and visa versa. Stability can also be obtained through the water rate structure. A rate structure incorporating elements of a demand charge would be much more stable than one based solely on a volume charge. Finally, adequate reserves also contribute to revenue stability by providing funds during periods of reduced sales.

Revenue Remainder (Working Capital) Fund

Section 5202 of Metropolitan's Administration Code currently requires a balance of \$130 million to be held as working capital in the Revenue Remainder Fund. The balance is split into two components: \$25 million for emergency repairs and claims (self-insurance), and \$105 million to cover revenue deficiencies. The latter is scheduled to increase to \$150 million next fiscal year.

The previous section of this report indicated that Metropolitan should be prepared at any time for a 500,000 acre-feet shortfall in sales. At projected sales levels and rates for Fiscal Year 1992-93, that would justify a reserve of \$150.4 million which exactly matches Metropolitan's plans.

In addition to the two items above, it is recommended that a routine working capital allowance be added to the requirement. Utilities in general allow for 30 to 60 days operation and maintenance expense in sizing a working capital requirement. A 45 day period is suggested. For Fiscal Year 1992-93, that would indicate an additional requirement of about \$24 million.

In total, a working capital reserve to be retained in the Revenue Remainder Fund of \$199 million is recommended for next fiscal year. The amount should be adjusted based on changes in projected sales and rates, operation and maintenance cost increases, and additional self insurance needs.

Working capital reserves should not be used to avoid rate adjustments. However, annual deviations from targeted levels should be accepted when necessary to smooth rate increases.

Working capital reserves should be re-established to target levels as soon as possible after an event requiring their use. This means that the requirement should be included in establishing the annual budget.

Rate Stabilization Funds

The Water Rate Stabilization Fund and Water Treatment Surcharge Stabilization Fund were established in 1987 and 1988 respectively. The purpose of the funds, as stated in Section 5200 of Metropolitan's Administrative Code, is to reduce future water revenue requirements and mitigate required increases in the rate surcharge for treated water. The Funds were established during a period of high water sales.

Effective July 1, 1990, the combined balance in the Stabilization Funds was approximately \$312 million. It is anticipated that the Funds will have zero balances by June 30, 1994. The Funds have enabled Metropolitan to adopt minimal rate increases effective July 1, 1991, and July 1, 1992, while facing significant increases in costs and declining sales due to the restriction imposed under the IICP. While the Funds have functioned as intended, it is not suggested that they be returned to previous levels. It is also not suggested that restoration of the Rate Stabilization

Funds be budgeted. Rather, the Funds can be accumulated whenever excess revenues are collected from higher than projected levels of sales.

Section 5200 of Metropolitan's Administrative Code defining the Rate Stabilization Funds indicate they may be used for any other lawful purpose in addition to the stated intent. It is suggested this policy be modified to clearly indicate that the Funds may only be used to meet emergencies such as earthquake damage repair, in addition to their intended purpose. Furthermore, if Metropolitan is able to maintain working capital reserves as suggested herein, the maximum level in the Funds should not exceed \$100 million. If Metropolitan collects excess revenues when the Funds are at their maximum levels, those excess revenues should be used for other purposes such as financing capital improvements.

Pay-As-You-Go Funding (PAYGO)

Pay-As-You-Go Funding (PAYGO) was established in 1988. Section 5109 of Metropolitan's Administrative Code indicates that the objective of the Board is to fund 20 percent of the cost of capital projects on a pay-as-you-go basis. A PAYGO Fund was established as a repository into which revenues could be deposited and from which expenditures could be paid. Revenues deposited into the Fund include operating revenues, standby charges, services charges, benefit assessments and proceeds from sale of property.

Preservation of debt capacity is the stated purpose of PAYGO funding. As discussed in another section of this report, alternative debt instruments are available to Metropolitan to finance capital improvements. Accordingly, the objective of PAYGO funding should be reexamined.

A more logical reason to collect PAYGO funds might be to match growth requirements with revenues derived from growth. Growth derived revenues, such as that from a water system connection charge, could be used to fund the PAYGO requirement. The portion of standby charge revenue collected from undeveloped property could also be used to fund the PAYGO requirement. The goal of PAYGO funding in any year should not exceed the receipt of such dedicated revenues. The long term goal of PAYGO funding could then be to support facilities required for growth. Since new customers will be connecting to the water system for many years into the future, the matching of revenues and revenue requirements must be done over the long term, not each year.

Use of dedicated revenues to fund PAYGO will remove a highly variable revenue requirement from the annual rate setting process. Shortfalls in receipt of dedicated revenues can be offset by sale of debt instruments. The immediate impact on rates, however, would be limited to the additional debt service created. If the annual capital improvement program requirements are less than the amount of dedicated revenues, the additional funds could be accumulated to finance major future projects or used early retirement of debt.

WATER RATES

Water rates are Metropolitan's primary source of revenue. Approximately 70 percent of total revenues is derived from the sale of water. Water rates can be increased at any time with Board approval.

Evaluation

Equity. Water rates applied uniformly to water use are an extremely equitable method of recovering of costs. Each of Metropolitan's member agencies pays the same rate for the type of service received. It is possible to enhance the equity of water rates by adopting alternative water rate structures. This is discussed in a later section of the report.

Revenue Stability. Table 2 indicates that revenues from water rates have declined only three times since 1970. Two of the declines were nominal. Only in fiscal year 1990-91 did Metropolitan experience a significant decline in water rate revenue. That decline resulted when sales were reduced under the IICP program without making a corresponding rate adjustment. Revenues from the Stabilization Funds were used to offset the revenue shortfall. Revenues for the current fiscal year are forecast to increase slightly over last year. Although water rate revenues appear to be relatively stable and predictable, the potential for variation in annual water purchases by member agencies makes this revenue source unstable.

Total usage may vary by as much as 20 percent from one year to the next. As discussed in the previous section, accurate prediction of water demands for a specific year is difficult because sales are strongly correlated to weather, which is not predictable in the short term. Therefore, only through maintenance of adequate working capital reserves can water revenue stability be obtained.

Implementation. Water rates currently used by Metropolitan would present no implementation issues. If alternative rate forms are considered it may become necessary to phase them in order to give member agencies time to adjust.

Administration. Any form of water rate would be simple for Metropolitan to administer.

Consistency with Metropolitan Policy. The only policy governing water rates is that they be uniform for a particular class of service. That policy presents no difficulty in structuring basic water rates.

Conservation Impact. Water rates are a primary tool used to encourage conservation. As a wholesaler, however, Metropolitan does not have the ability to use pricing as a tool to influence individual end-user behavior as part of an overall conservation program. Full recovery of Metropolitan costs through water rates would, as a minimum, require member agencies to pay in proportion to their cost of service.

Legal Challenge. Water rates as a revenue source should not be subject to legal challenge.

PROPERTY TAXES

The most stable form of revenue any governmental entity is ad valorem taxes. Once the assessed valuation and tax rate are known the amount of revenue can be determined. Revenue collection is almost 100 percent certain.

Property taxes were used to finance Metropolitan's construction and operations in the 1930's and 1940's. This stable source of financing enabled Metropolitan to be relatively immune to water sales fluctuations. As Metropolitan's sales during increased in the 1950's, water sales began to replace taxes as Metropolitan's source of revenue. In 1960, Resolution 5821 was adopted which required water revenues to cover at least 50% of Metropolitan's capital costs. In 1979, the proportionate use formula was established that required the percentage of Metropolitan's capacity that was actually used be the percentage of total revenue requirements recovered from water sales revenue.

During the 1980's, a series of actions by the Metropolitan Board and the California Legislature changed the level of taxes which can be assessed by Metropolitan. Beginning July 1, 1990, Section 124.5 of the MWD Act limits total tax revenues, other than from special annexation taxes, to the amount needed to pay:

- the general obligation bond debt service of the Metropolitan Water District, and
- that portion of Metropolitan's payment obligation allocable to debt service on the State's general obligation bonds (the Burns-Porter Act Bonds) which were outstanding in 1984 and which were used to finance State Water Project facilities of benefit to Metropolitan.

Under existing legislation, taxes will cease to be levied when the general obligation bonds of Metropolitan and the State Water Project are fully paid by 2024. Section 124.5 provides that in times of financial necessity, however, taxes may be increased beyond this limit. Implementation of these provisions will cause a further decline in tax revenue.

Raising tax revenues in excess of the limits set forth in the MWD Act would require Metropolitan to find that additional tax revenue is necessary for fiscal integrity and to file a notice with the State Assembly and Senate. Since Metropolitan has the authority to increase revenues by adjusting water rates, it would be difficult to demonstrate a need for tax revenues in excess of the current limits.

Evaluation

Equity. Property taxes are based on assessed valuation. Therefore, they are not an equitable method of charging for water service which has no relationship to assessed valuation. Property taxes do not recognize the level of service actually provided by Metropolitan within each member agency.

Stability. As previously mentioned, taxes are a very stable form of revenue.

Implementation. Taxes are levied directly upon property owners and do not involve member agencies in their implementation.

Administration. Taxes require very little administration by Metropolitan.

Consistency with Metropolitan Policy. As previously discussed, specific legal guidelines govern the level of taxes. Metropolitan complies with those requirements.

Conservation Impact. Taxes do not aid in achieving water conservation.

Legal Challenge. Metropolitan has been subject to a number of legal challenges over taxes. At current levels, no legal challenge to use of taxes is anticipated.

ANNEXATION CHARGES

Section 3300 of Metropolitan's Administrative Code allows a special charge be assessed to newly annexed areas. The charge is to be the greater of either a back tax computation or a per acre charge reflecting the District's equity. Annexation Charges represent a small portion of annual revenues and are not a major source of revenue for Metropolitan.

Computing District equity on a per acre basis may not be proportionate to the potential water usage of a newly annexed area. It is suggested that Metropolitan investigate computing equity on a per acre-foot of water basis. A charge computed on that basis could then be applied to an estimate of the anticipated water use in a newly annexed area. Under this method, an intensive water using area will pay a larger annexation charge than an area with lower water demands.

Metropolitan may find the basis of its annexation charges should be modified if a connection charge is adopted. The modification to the annexation charge would depend in part upon the method used to establish a connection charge. If the connection charge is intended to recover costs of growth related capital improvements, it should be applied to all connections added through annexations. Such a connection charge would be in addition to the annexation charges. If the connection charge is based on District equity only, the annexation charge should be modified to include only past taxes.

Evaluation

Equity. Annexation charges are an equitable approach to bring new areas into Metropolitan on an equal standing with those in the original service area.

Stability. Annexation charges are not a stable source of revenue because annexations are limited.

Implementation. Annexation charges are a current revenue source. There would be no implementation issue surrounding its continued use.

Administration. Again, as a current revenue source, Metropolitan is already administering this source.

Consistency with Metropolitan Policy. Current and potentially revised annexation charges are consistent with current policy.

Conservation Impact. Annexation charges do not affect water conservation.

Legal Challenge. Annexation charges are specifically authorized by the MWD Act.

STANDBY CHARGES

Section 134.5 of the MWD Act authorizes the Board to impose a water standby charge. Metropolitan adopted a \$5.00 per parcel standby charge for fiscal year 1992-93 on May 12, 1992. The charge is expected to generate approximately \$25 million in annual revenue.

A standby charge represents one approach to provide a more stable revenue stream from those who benefit from expanded system capacity. A standby charge can be levied (1) only on undeveloped property or (2) on both developed and undeveloped property as Metropolitan has done. The imposition of a standby charge on developed property as well as undeveloped property allows reduction of water charges to all customers. Since standby charges are independent of water usage, and water charges are not, the effect is a shift from variable to fixed revenue.

For undeveloped parcels, the charge represents a method of collecting revenue from those who are benefitting, directly or indirectly, from system capacity improvements. The large number of undeveloped parcels paying a standby charge is a significant advantage of the approach. In addition, parcel charges, such as the one proposed by Metropolitan, are usually set at low levels. A disadvantage of a parcel charge is property owners who do not anticipate development or who are precluded from development object to paying for facilities that they have no plans to use.

Evaluation

Equity. A standby charge is an equitable method of raising revenue for facility expansion because the net impact on developed property is negligible but the charge adds undeveloped property as a new revenue source. Most undeveloped property benefits from the availability of a water system. A potential equity problem surrounds those properties which have little or no development potential. It is likely that some exemption or payment deferral procedure would need to be established.

Stability. Once adopted, standby charges are a very stable source of revenue.

Implementation and Administration. Standby charges may be easy to implement for member agencies. For Metropolitan, however, their implementation is much more complex. Current estimates are that it may cost up to 7 percent of the first year's revenue to implement. Administration of the charge will require considerable on-going effort.

Consistency with Metropolitan Policy. Standby Charges are authorized by the MWD Act.

Conservation Impact. Standby charges are considered non-conducive to water conservation since they represent a fixed revenue source which would otherwise be collected through water rates.

Legal Challenge. Standby Charges, as a new revenue source, are subject to legal challenge.

SERVICE CHARGES

The same sections of the MWD Act which authorize standby charges also authorize service charges to be levied by Metropolitan. Metropolitan's authority with respect to service charges is very broad. The amount of revenue to be collected through a service charge is to be determined by the Board as is the method of collection. The Act indicates methods which may be considered include, but are not limited to, historical water usage, projected demands, acreage, property parcels, population, assessed valuation, or any combination of those. The charge would be collected from member agencies.

On May 12, 1992, Metropolitan adopted service charges to collect \$25 million in fiscal year 1992-93. The basis for the charge has been set at the average of the last four years of water usage by each member agency. Thus, the service charge functions as a mechanism to convert a portion of variable water sales revenue to fixed revenue.

Evaluation

Equity. Because the service charge is based on water usage it has the same basic elements of equity as water rates. Using a four year average, however, means that

the service charges will not reflect current usage and initially some member agencies will pay more and some less than if the revenue were recovered through the water rate structure. Over time the variations in usage will even out and each member agency will receive service charge allocations directly in proportion to usage.

Stability. Perhaps the greatest advantage of the service charge is the revenue stability it will provide. Member agencies will be assessed \$25 million per year whether or not they use any water from Metropolitan in the current year. The more revenue Metropolitan can collect through a service charge the less water sales fluctuations will impact it.

Administration. A Service charge is one of the simpler methods available to Metropolitan for revenue collection. This makes the charge very advantageous compared to implementing a connection charge or a standby charge.

Implementation. Member agencies will have varying degrees of difficulty incorporating the service charge into their revenue systems. Agencies which basically use the Metropolitan water rate as the foundation of their rate structure will need to develop a method to convert the service charge to a volume charge. Others may be able to add the service charge to a fixed charge component in their own retail rate structure.

Legal Challenge. Because the service charge is strictly authorized in the MWD Act and because it is levied only on member agencies, no adverse legal action is anticipated.

CONNECTION CHARGES

One of the principal tasks of this study is to assess the feasibility and suitability of revenues from new development. The means of collection can be thought of as a charge paid at the start of construction. The charge amounts would be proportional to typical water consumption for each type of user as measured by a water meter. For example, if the charge were to be set equal to \$1,500 for each acre foot annually (AFA) of average water consumption, then a single family home fee might be charged \$900, based on a projected use of 0.6 AFA. The charge would apply to a 5/8 or 3/4 inch meter typically installed to serve a single family home. Charges for other users with larger meters would be higher.

The charge would be imposed on new development at the time construction is initiated. It could be required as a condition either of a building permit or of a water connection.

The rationale for seeking revenue from new development is simple. The cost of capital facilities is a major share of Metropolitan's budget. A large portion of the capital facilities expenditures are for the purpose of increasing Metropolitan's effective water supply and delivery capability, in large part in order to accommodate new development. Revenues from new development can help Metropolitan provide

that capacity. To the extent that new development funds this portion of capital expenditures, the capital costs imposed on customers though the water rates are reduced.

Buy-in Charges

Two parallel legal concepts provide alternative bases for imposing connection charges: buy-in charges and impact fees. Each of these concepts is associated with a different approach to the adoption of a charge program. The concept of a connection charge paid to "buy into" a capital intensive utility system has been commonly used for many decades. The charge is usually calculated based on the existing capital investment or replacement value in the existing system. Revenues are then usually invested in capital additions to the system. Such an approach is similar to Metropolitan's Annexation Charge.

Metropolitan does not currently have express statutory authority to impose either a capacity or a connection charge. However, proposed legislation (AB1875) is presently pending in the State Senate. AB1875 would add a new chapter to the water code which, subject to specified limitations, would authorize water districts, in addition to other powers, to prescribe and collect water capacity and connection charges. Absent enactment of AB1875, Metropolitan would need to seek specific legislative authority for the imposition of a capacity or connection fee.

Impact Fees

An alternative concept, the imposition of impact fees, has come into widespread use recently. Impact fees are more likely to be calculated based on the estimated cost of additional capacity, i.e., the cost of additional capacity is the impact caused by new development.

The basic authority for impact fees derives from the government's "police power," the constitutional rights of local government to promote public "health, safety and welfare." The imposition of impact fees is conditioned by California Government Code Sections 66000 et seq. The conditions of these sections generally reflect constitutional protection against excess fee amounts and misuse of fee revenues.

Revenue Projection

Metropolitan has a wide range of options in determining the amount of the charge to be assessed, although the charge may not exceed the calculated cost of buying into existing facilities or of adding additional capacity. Based on a preliminary review of planned system improvements, staff has estimated that additional capacity will cost approximately \$1,500 per AFA. Assuming a charge schedule based on this amount, and assuming a single family house average of 0.6 AFA, the fee imposed on a 5/8 or 3/4 inch meter to serve that house would be \$900. The calculation for other meter sizes would reflect their capacity to deliver water.

The projected new development in Metropolitan's service area will increase water supply requirements by an average 40,000 acre-feet per year in the 1990-2010 decades. A charge of \$1,500 per AFA would generate about \$60 million annually. For purposes of this report, it has been assumed that Metropolitan could readily collect approximately \$50 million per year from a connection charge. The actual amount can only be determined upon further study of the level of a charge which can be justified.

Evaluation

Equity. The rationale for imposing connection charges on new development is that new development should fund the cost of facilities required to accommodate it. The charge may be based on the cost of facilities already constructed or the cost of additional capacity which will be needed to serve growth. The concept of a connection charge is that existing customers should not be required to subsidize the cost of serving growth.

Acceptability. As the costs of public infrastructure have escalated, fees imposed on new development are increasingly seen as an appropriate source of funds for infrastructure needed by that development. This viewpoint was reflected in the responses to the questionnaire submitted to the Metropolitan Board of Directors and to the managers of Metropolitan's customer agencies. The general public also favors charges on new development over raising water rates or taxes.

The development industry is obviously less enthusiastic about such charges. Given the present recession, the industry is particularly sensitive to additional costs and may protest their imposition. Experience indicates, however, that charges for basic utility services are not as subject to challenge as impact fees in general.

Revenue Stability. Charges on new development are inherently an unstable revenue source. New connections have varied by as much as 100 percent over the last decade. Given this fluctuation, it appears that connection charges should not be viewed not as a stable revenue source for meeting fixed costs. Connection charges are appropriate to shift revenue responsibility over the longer term to fund pay-as-you-go capital projects.

Ease of Administration. The ease with which a connection charge program could be administered would vary with the mechanisms by which the charge is collected. In general, the imposition of connection charges involves more administrative effort than does the collection of revenues through water rates.

Most connection charge programs include an allowance to cover the cost of administration. The majority of these allowances are between two and three percent of the amount collected. Where more than one agency is involved, the administrative component of the charge is usually apportioned among those agencies. Thus, if Metropolitan requested its member agencies to collect a connection charge, it might pay a fee to the collecting agency to compensate it for the cost of collection.

Implementation of a Connection Charge

Documentation. The imposition of a connection charge requires a demonstration that the amount is justified. This is usually provided in a justification document. If the basis for the charge is a buy-in to existing facilities, this document will set forth the historic costs and the calculation of the charges based on them. If the charge is based on future costs of adding new facilities, the document will set forth the costs of the facilities required to provide capacity for new development.

Some technical considerations are involved in the calculation of connection charges. One such consideration is that a credit is given for existing debt. In other words, the charge is reduced by the extent that new customers as ratepayers will contribute to payments for debt already incurred. If the charge is based on a buy-in of existing facilities, new development is appropriately assessed only the equity in, not the total price of, existing facilities. Similarly, if the charge is based on the cost of facilities to serve growth, new development should not be expected to pay for existing facilities.

The appropriate cost basis is another technical consideration. In the case of buy-in charges, the most common practice is to use historical costs adjusted for depreciation. An alternative method is to use depreciated replacements cost. The usual practice when the charge is calculated based on the cost of additional capacity is to use present dollar costs of projected construction. In both cases the charge is typically adjusted for escalation in facility costs.

The purpose of a justification document is to demonstrate that there is a "reasonable relationship" between new development and the facilities to be constructed with the connection charge revenue (California Code Section 66001). This information is evidence that the imposition is a legitimate charge program rather than a tax which could not be imposed without submitting the proposed program to a vote.

Means of Collection. There appear to be three alternative approaches to the collection of Metropolitan connection charges:

- 1) Payment to retail water agency at time of connection.
- 2) Payment to city/county as a condition of building permit.
- 3) Payment to Metropolitan as a condition of building permit.

It is also possible for the program to be a mix of these approaches.

The primary consideration in choosing an approach is the minimization of administrative burden to public agencies and those paying the charges. Most builders already pay a connection or impact fee in the process of securing a building permit or connecting to a water system. It would appear advantageous to have any charge adopted by Metropolitan collected at the same time. Collection by the retail water agency at the time of connection is the most convenient approach.

SUMMARY OF ALTERNATIVES

Table 6 presents a summary of the evaluation of each revenue alternative. Water rates, taxes, and annexation fees are rated the highest primarily because each is currently utilized. The other revenue forms are not nearly as highly rated primarily due to administration and implementation difficulties. From an equity viewpoint, connection charges would enhance Metropolitan's overall revenue equity because the changes would result in growth paying for growth, and bring revenue collections to a more growth neutral position. Unfortunately, connection charges are not considered a very stable revenue source.

RECOMMENDATIONS

- Emphasis on fixed and variable revenue should be diminished. It is in the best interest of Metropolitan, its member agencies, consumers and the State that the price for water reflects the cost of water.
- Revenue stability can be achieved through increasing revenue diversity (addition of standby, service, and connection charges), rate structuring (discussed in a later section), and prudent use of Rate Stabilization Funds.
- Metropolitan should revise its PAYGO policy. PAYGO should be funded with a dedicated revenue source, not water rates. Near term demands of the CIP make it difficult, if not impossible, to meet the current PAYGO policy.
- Metropolitan should adopt a policy which requires new development to pay for the cost of new facilities which provide the capacity to accommodate it.
- Metropolitan should cause charges to be imposed on new development. If Metropolitan is provided the legal authority through new legislation to require that connection charges be paid, it should avail itself of that authority and impose that requirement.
- The maximum legal connection charge amount should be calculated based on the cost of a program of facilities that will provide the capacity to accommodate new development. Alternatively, Metropolitan may choose to calculate the charge amounts based on the cost or value of existing facilities. The latter approach parallels the current annexation charge methodology.
- Metropolitan should set connection charge amounts after consideration of the legal maximum amounts, the cost of additional capacity, its planned facility construction program, alternative funding sources and the burden of the fees on new development.

TABLE 6

EVALUATION OF ALTERNATIVE REVENUE SOURCES

CRITERIA	WATER RATES*	TAXES*	ANNEXATION FEES*	STANDBY CHARGE#	SERVICE CHARGE#	CONNECTION CHARGE ¹
1. Equitable	High	Low	High	Medium	Medium	High
2. Revenue Stability	Medium	High	Low	High	High	Low
3. Easy Implementation	High	High	High	High	High	Low
4. Consistency with Policy	High	High	High	Medium	Medium	Medium
5. Aids Conservation	High	Low	Low	Low	Low	Medium
6. Easy to Administer	High	High	High	Low	High	Low
7. No Legal Challenge	High	High	High	Medium	High	Low

* Currently used
Being implemented
¹ Proposed

- Metropolitan's intention should be that the charges are paid at the time of, and as a condition of, connection to a water system. The charge should be based on the size of the water meter installed at a new connection.
- Metropolitan should not collect the connection charges. They should be collected by the retail water agency providing the connection, in the same manner they collect their own connection charges. In some situations it may be determined to be more suitable to have the charges collected by the local government issuing the building permit. Metropolitan should agree to pay an administrative fee to member agencies for collecting the charge.
- Because the revenue requirements facing Metropolitan for the next several years are extensive, it is suggested all available revenue sources be utilized. That includes the maximum level of taxes under the MWD Act, standby and service charges at levels currently proposed and connection charges.

CAPITAL FINANCING

This section of the report reviews Metropolitan's capital financing needs and available sources of funding. Projected future annual debt service costs are developed using a mix of debt instruments.

Metropolitan is embarking on a series of major capital improvements to its systems to increase the availability, reliability and quality of water for southern California; water which is vital to the economic health and welfare of the region and its inhabitants. Metropolitan is currently not financially prepared to undertake such a capital improvement program. Its revenue base has not kept pace with expenditure growth, and financial reserves are no longer adequate. A successful outcome for the capital improvement program will require long term commitment of adequate resources.

CURRENT DEBT STRUCTURE

Metropolitan currently has both short term and long term debt outstanding.

Short Term Debt

Metropolitan currently has \$60 million of outstanding debt in commercial paper. The Board has authorized the issuance of up to \$200 million under this program. The use of commercial paper allows Metropolitan to fund capital projects on a short-term basis and then convert to long term debt when market conditions are favorable.

Current CIP expenditure projections do not include retiring the \$60 million of commercial paper currently outstanding. Commercial paper typically has a lower interest cost than long term debt. The outstanding balance is included in the asset to liability computation and thus has an effect on equity.

Metropolitan's commercial paper has been rated P1/A1 without any liquidity facility or credit enhancement. This reflects positively how the rating agencies view Metropolitan's ability to meet short-term cash flow requirements. If the commercial paper program is increased, the use of a liquidity facility may be required to maintain the current rating with an additional cost to Metropolitan of approximately ten to thirty basis points of the commercial paper program size annually.

Long Term Debt

The current CIP estimates call for approximately \$6 billion in expenditures by 2010. Financing of the program will result in Pay-as-you-go and debt service expenditures exceeding \$500 million annually by the 1997-98 fiscal year. Metropolitan has general obligation bonding authorization of at least \$35 million and possibly \$50 million based on the preliminary opinion of Bond Counsel.

Based on current projections, Metropolitan will be constrained from issuing additional revenue bond debt by the asset to liability ratio contained in the legislative statutes governing MWD. The use of Certificates of Participation (COPs) would avoid the asset to liability ceiling but will involve increased borrowing costs. The labeling of these issues as "Lease Revenue" or "Installment Revenue" may avoid the recently associated stigma with COPs due to the Richmond School District's problems, and reduce borrowing costs. Therefore, Metropolitan may incur additional borrowing costs but the ability to utilize long term debt to finance the CIP is assured.

CAPITAL FUNDING GUIDELINES

Legislative Guidelines

Metropolitan is subject to the following statutory limitations on debt issuance:

- Assessed value limits the amount of debt outstanding to less than 15% of the total assessed value of Metropolitan.
- An asset to liability test limits Metropolitan to a 1:1 ratio on the level of revenue bond debt Metropolitan may have outstanding. The current CIP requires debt issuance which would bump up against this limit by the 1995-96 fiscal year. Possible alternatives include:
 - The use of COPs.
 - Shorter term debt which builds up the equity faster.
 - Redefining how assets are valued thus increasing equity. This is further discussed in a later section of the report.

Metropolitan Policies

The following are some of Metropolitan's current financial policies:

- Pay-as-you-go (PAYGO) is to comprise 20% of the CIP including projects meeting the following criteria:
 - Useful life shorter than that typical for long term debt.
 - Cost is less than \$1 million.
 - Projects relating to planning.
 - Other lawful purposes as determined by the Board.

As discussed previously, it is recommended that PAYGO be funded with connection charges as a dedicated revenue source and limited to that level.

- The CIP is adopted for a single year with the Board reviewing the total cost for the next 10 years - but not the individual projects. This policy has the following consequences:
 - Positively avoids having to do an Environmental Impact Review (EIR) for all projects included in the five to ten year listing of capital programs.

- Shortens the planning horizon for revenue requirements.

FUTURE CAPITAL REQUIREMENTS

Capital Improvement Plan through 2010

As of December 1991, Metropolitan had identified approximately \$6 billion in capital requirements through the 2010 fiscal year. These projects are needed to overcome existing deficiencies and to provide for anticipated future growth within Metropolitan's service area. The Board has approved the capital projects for the current fiscal year and has reviewed the total dollar cost of future capital requirements. Therefore, the actual funding of capital projects may vary from current levels significantly reducing the accuracy of projections.

The most striking aspect of the program is the increase in expenditures for the 1995-96 through the 1997-98 fiscal years. Approximately \$2.4 billion, or 42% of the total CIP expenditures occur during this period. This will require significant debt issuance by Metropolitan.

ALTERNATIVE FINANCING MECHANISMS

While Metropolitan cannot pay for all of the CIP projects on a cash basis, it can generate sufficient revenues and cash flow to meet anticipated capital requirements if a debt financing is utilized. Metropolitan has a number of alternatives available to assist in the financing of the capital improvement projects.

In determining which financing mechanism best assists Metropolitan's efforts to complete the projects, the first concern should be security. The financing mechanism selected should provide a secure revenue source that, to the largest degree possible, assures the ability to repay debt. Therefore, the security for the debt should be a steady, reliable and adequate revenue stream. The financing mechanism must also have the capability to be implemented in a timely and cost-effective manner. The financing vehicle must be sensitive to alternative construction schedules, project planning, and other timing factors. The recommended financing type must also be a low cost method of finance widely recognized in the credit market. A brief description of the primary methods of debt financing available to Metropolitan follows.

General Obligation Bonds

General Obligation Bonds offer Metropolitan the least expensive form of long term, fixed rate municipal debt. The low interest rate is due to the high level of security offered to bondholders who receive a "full faith and credit" guarantee of Metropolitan to meet debt service payments. The security of general obligation debt also does away with the need for a debt service reserve fund, thus eliminating the need for an approximately 5% larger borrowing, assuming reserves are funded with bond proceeds.

Metropolitan currently has at least \$35 million in general obligation bond authority remaining. Metropolitan's bond counsel has indicated that, subject to validation proceedings, there may be an additional \$15 million in capacity.

To issue additional general obligation debt, Metropolitan must receive a two-thirds majority vote at a local election to authorize the issuance of debt and the levy of an ad valorem tax on property to repay the borrowing. Metropolitan may additionally rely on other legally available funds to meet debt service needs or supplement the ad valorem tax. Bonds which have a revenue source in addition to taxes pledged for debt retirement are usually referred to as "double barreled" bonds.

Although the General Obligation Bonds offer the lowest interest rate and the smallest principal amount of bonds issued, it is not always the preferred financial mechanism alternative. The time and expense involved with a bond election for General Obligation Bonds must be considered. An additional consideration is the likelihood of obtaining a two-thirds approval of Metropolitan's voters.

Metropolitan should therefore retain the remaining general obligation capacity as a long term financing reserve should the need arise to gain rapid access to the credit markets.

Revenue Bonds

Revenue Bonds are the preferred financing mechanism of Metropolitan. Issues to date have had interest rates below market averages and have been well received.

As indicated above, the MWD Act limits the amount of Revenue Bonds Metropolitan can have outstanding to its equity. Based on the current financial position of Metropolitan, that would enable only about \$1.65 billion of additional Revenue Bonds to be issued, an amount insufficient to finance the CIP.

Certificates of Participation

An alternative debt mechanism we believe is available to Metropolitan is that of Certificates of Participation (COPs). There are basically two types of certificate structures: 1) lease purchase arrangements, and 2) installment sale agreements subject to certain statutory restrictions.

Certificate financing is based on the same theory as non-profit corporation financing, i.e., providing long-term financing through a long-term lease or installment sale arrangement. Certificates represent a proportionate interest of the holders to receive a portion of each payment made by the public agency under the installment sale agreement or lease between the public agency and third party.

Under the lease type of arrangement with the COP, Metropolitan enters into an agreement with a third party (lessor) or non-profit corporation to lease the facilities over a long-term period. The lessor remains as the owner of the facility until the

debt service has been fully repaid. Under this arrangement, Metropolitan cannot make lease payments until it has the "use and possession" of the facility. Thus, if the construction period of the project is six months to a year, additional money in the debt issue must be allowed to pay the interest cost during the construction period. This amount, known as capitalized interest, increases the size of the issue.

Under an installment sale structure, COPs have some subtle differences. The title to property would pass through the lessor and trustee back to Metropolitan. Metropolitan is required, under the installment purchase agreement, to make installment payments from net revenues of the enterprise and agrees to revise and collect fees and charges necessary to insure that the payments will be made. The obligation of Metropolitan to make installment payments constitutes a special obligation of Metropolitan payable solely from net revenues. Metropolitan owns the facility, and is obligated to continue to make payments while the lessor does not have the ability to reclaim the property as an owner would. Since Metropolitan owns the facility from the beginning of the transaction, there is no requirement to capitalize interest within the issue. Therefore, Metropolitan can finance the same improvements as the lease purchase option while borrowing less money.

The issuance of COPs is not subject to the statutory requirements applicable to the issuance of revenue bonds of a non-profit corporation in the following respects:

- The public agency is not required to publish an ordinance and subject the project to referendum, as required in the non-profit corporation financing.
- The sale of COPs is not subject to public bidding requirements. Certificates may either be negotiated or publicly bid.
- The construction of the improvements may not be subject to public bidding requirements.

Except as provided above, the concepts involved in these two methods of financing are essentially the same.

The issuance of COPs by Metropolitan is one possible method of providing for the financing of the projects. To issue COPs, Metropolitan would need to identify secure, long-term revenues that would be available to retire the debt. Metropolitan would be required to make a General Fund pledge to act as security.

Typically, COP issues are rated on a credit rating lower than on issuers' general obligation debt because COPs are not backed by the issuers' "full faith and credit." Therefore, annual interest rates are approximately 25 to 50 basis points more per year than general revenue bonds with a corresponding higher annual debt service. The process of issuing COPs is relatively straightforward and can be accomplished fairly quickly. It should be remembered that no election is required to issue COPs,

and that given acceptable levels of cash flow, security, and debt coverage, the market readily accepts COPs.

Dedicated Connection Charges

As outlined in previous sections, Metropolitan can utilize future connection charges to fund the pay-as-you-go portion of the CIP. For planning purposes our analysis assumes \$50 million per year. This amount can be increased if connection charges are increased annually.

The use of a connection charge would ensure that new development paid for a portion of the facilities required to allow for future growth. Although not generally considered a reliable funding source for long term debt, connection charges would provide an additional revenue source and mitigate the size of future debt issues.

Joint Powers Authority

Metropolitan might consider establishing a Joint Powers Authority (JPA) when the benefit of a project is limited to an individual agency or group of agencies. The cost of the project may be borne by the agency entirely, with a back-up pledge of financial support by Metropolitan, or shared with Metropolitan based on the percentage of benefit accruing to each party. The member agency would benefit from the credit strength of Metropolitan through lower borrowing costs and the construction of projects that may not otherwise have been undertaken. Metropolitan would then be able to assess the cost of the project to those receiving the benefit.

Another rationale for the JPA approach is for projects where the economies of scale make it feasible to build one large facility in place of two or more smaller ones. Using this reasoning, the cost of building a larger facility like a reservoir, should be less than the construction of separate facilities.

Although a JPA may be a cost effective approach, it may require a change in the current philosophy whereby the entire Metropolitan system is deemed to benefit all users.

FINANCING ISSUES

Listed below are some of the major financing issues that should be addressed by Metropolitan and recommended courses of action.

Reserve Funds

The reserve fund size for Metropolitan's outstanding revenue bonds is equal to 50 percent of maximum annual debt service (MADS). This is well below the standard 1.0 x MADS coverage requirement for most revenue bonds in the municipal market and reflects positive perception of Metropolitan as a credit. The smaller reserve fund size is possible due to the substantial financial resources of Metropolitan available to

pay debt service on the bonds should any short-term cash flow problem arise. As Metropolitan finances the projects identified for the next 20 years, the increased amount of debt outstanding and changes in the municipal market may require increasing the size of the reserve funds to maintain Metropolitan's credit rating.

The \$300 million revenue bond issue of July 1991 was the first time Metropolitan funded a revenue bond reserve fund from bond proceeds. Previously, Metropolitan had funded these reserves from operating revenues. Although this increases the size of a borrowing, federal arbitrage restrictions have negated most of the advantages of utilizing operating revenues to fund reserve funds by imposing yield restriction on these funds.

Rate Covenants

The concept of coverage (for revenue bonds) is a basic credit issue which will be reviewed by the rating agencies. If a debt obligation is secured with a general operating fund, the net revenues (gross operating and non-operating revenues less operating and maintenance expenses) should exceed the total debt service requirements by a factor of 1.0 to 1.20. As debt service increases in future years, Metropolitan will need to raise rates and charges so that the available revenues to pay debt service provide adequate coverage. In its Revenue Bond Resolutions, Metropolitan has pledged to raise those rates as needed to obtain the agreed coverage ratio.

In the current debt market, Metropolitan's bonds are well received with coverage ratios of 1.00, the lowest possible level. For planning purposes, we would recommend that Metropolitan target a 1.10 coverage ratio and reserve the right to covenant to a lower coverage ratio in accordance with market conditions at the time of issuance.

Competitive vs. Negotiated Sale

Metropolitan has the option of issuing debt on a negotiated basis or on a competitive basis. Under a negotiated concept, Metropolitan selects an underwriter who would assist in the preparation of documents and in structuring the transaction. Metropolitan negotiates with the underwriter on their charges, and other terms and conditions of the debt issue. At the time of the sale, the interest rates to be paid on the debt would be a matter of negotiation between Metropolitan and the underwriter, depending upon market conditions at the time. If Metropolitan decides to use a negotiated process, the financial advisor may assist in negotiating with the underwriter on the various terms, rates, charges, covenants and conditions of the transaction.

Under a competitive sale arrangement, an Official Statement is prepared and used to seek bids. A Notice of Sale is published, and all underwriters are invited to submit competitive bids on the date of the sale. Under either negotiated or competitive sale, bond counsel is utilized to prepare the legal documents relating to the transaction.

Negotiated sales are normally used in situations where the transaction is very complicated or large, the credit is weak, there is instability in the bond market, or there are certain factors which need to be explained to investors who are involved in the transaction (Story Bonds). Competitive sales are generally used in very straightforward transactions where the credit is not in question, the bond market is stable, and the project itself does not require an unusual amount of explanation. Metropolitan sold the 1991 revenue bonds under a negotiated sale due to the large size of the issue (\$300 million). Metropolitan plans a negotiated sale for the next revenue bond issue.

Independent research has shown that by and large, similar issues at similar times in the market with similar credit ratings received slightly lower interest costs on a competitive sale than on a negotiated sale. That cost differential has narrowed recently as markets have become very competitive. The municipal market has recently demonstrated an increasing appetite for large issues on a competitive basis, as demonstrated by the recent \$1.4 billion competitive sale by the State of California.

There are many advantages to both negotiated and competitive sales which need to be evaluated in light of market conditions and Metropolitan's goals. Metropolitan should maintain its flexibility to use either negotiated or competitive bond sales. In general, adherence to the principals set forth in the Government Finance Officers Association publication "An Elected Official's Guide to Government Finance" is suggested. It states

"Competitive sales should be used to market debt whenever feasible. For certain large, irregular, and difficult to place issues, negotiated underwriting may be necessary. If negotiation is used, special care must be taken to ensure that underwriter profits reflect genuine risk."

Surety

Metropolitan may apply for an insurance (surety) policy to replace the funds in a reserve fund. For a fee, the insurance company will guarantee the payment of draws on the reserve funds in the event Metropolitan is unable to make principal or interest payments. If Metropolitan obtains insurance, the rating for the reserve fund would be triple A ("AAA"), the highest possible rating. Using this insurance would free up monies in the existing reserve funds and reduce the issue size of future borrowings. While the rating on the bonds may or may not improve when a surety policy is used, the municipal market would view the bonds as a stronger credit possibly resulting in a lower interest rate on the bonds.

The fees on surety policies are usually one time up front premiums, ranging from 3% to 6% of the size of the reserve fund or an annual fee of 50 to 100 basis points. (1 basis point = .01%). The decision as to whether a surety policy should be purchased is a cost-benefit analysis of the reduced borrowing size and/or the opportunity cost of monies in the reserve funds vs. the cost of the premium.

Metropolitan currently has some \$30 million in its Revenue Bond Reserve Fund. Replacing those reserves with a surety policy in 1992-93 would provide much needed funds for cash flow purposes. This can be accomplished by increasing the reserve fund to 100 percent of annual debt service and replacing it with a surety policy.

Use of surety policies on future revenue bond issues would preserve debt capacity.

Revenue Stability

From the rating agencies perception, the greater percentage that fixed revenues comprise of total revenues, the better the credit. The use of fixed revenues, however, must be balanced with overall financing goals.

Commercial Paper Program

The commercial paper program should be utilized up to the current authorization of \$200 million on a short term basis when necessary. This may require the use of a liquidity facility which will increase costs by ten to thirty basis points on the face amount of the letter of credit (LOC). Funding through the commercial paper program should be used as a bridge to long term financing - with market conditions determining the point at which financings are converted to long term rates. The existing \$60 million of outstanding commercial paper should be retired as cash flows become sufficient.

Shelf Registration

Metropolitan should explore the option of shelf registering future debt borrowings. This procedure would allow Metropolitan to register with the securities and exchange commission (SEC) a set amount of future borrowing needs. Then, as the need or opportunity arise, Metropolitan can access the credit markets for the total amount registered or a smaller increment. SEC rule 15 (c) 2-12 requires that a current Official Statement or similar disclosure document be prepared prior to the sale of debt. This may lengthen the time to access the credit markets and reduces some of the advantages of shelf registration.

Shelf registration has been used by issuers who require frequent access to credit markets (i.e. New York City, Puerto Rico). Given the level of borrowing needed to fund the CIP, Metropolitan may benefit from the use of shelf registration. The legal work necessary to program and update SEC filings may preclude this option.

Long Term Financial Planning

By adopting a CIP with a one year time frame, Metropolitan's ability to integrate the long term capital needs with future revenue requirements is limited. It is our understanding that staff currently projects financial and capital requirements for the next 20 years. Our recommendation is to continue planning for 20 years with the adoption by the Board of a ten year capital/financial plan subject to annual review.

The process would be similar to that used by most public utilities. A ten-year rather than a five-year time-frame is recommended because of the size and complexity of Metropolitan's CIP.

Hedging Instruments

The recent volatility in the municipal marketplace has created products that allow issuers to benefit from perceived inefficiencies in the municipal market. The use of hedging instruments such as interest rate swaps have become a fixture in corporate finance, and have recently been adapted for use in the municipal market.

Metropolitan can achieve lower borrowing costs (ten to twenty basis points) on its long term debt through the use of the hedging instruments. However, there is some risk that Metropolitan may actually pay additional borrowing costs. Therefore, before it engages in the use of hedging instruments, Metropolitan must understand and fully weigh the risks and benefits of these products.

FINANCING PLAN

To accurately assess the impact of capital expenditures on Metropolitan's financial requirements, a computer model was developed to estimate future debt service requirements and perform a sensitivity analysis.

Tables 7 through 10 present the output of the computer model. Table 7 summarizes the financing assumptions and capital improvement program requirements for the fiscal years 1991-92 through 2009-10. The proposed program total is \$5,826,401,000.

The model utilizes the CIP figures presented to the Board in December, 1991. The base model included the following assumptions on future capital requirements.

- A 30 year period for long term debt instruments.
- Interest rates set at:
 - 6.50% for GO bonds
 - 7.00% for Revenue Bonds
 - 7.25% for COPs
 - 5.00% for commercial paper
- Issuance costs would be 2 percent.

Table 8 summarizes the proposed funding sources assumed to be used to finance the program. Basically, a mix of revenue bonds and COPs have been utilized. PAYGO is set at \$50 million per year - the level of assumed connection charge revenue. We suggest that Metropolitan begin issuing COPs before reaching the revenue bond debt equity limitation in order to establish familiarity with those debt instruments and to familiarize the market with them. Table 8 shows some 2.8 billion in COPs are indicated for the 1993-94 through 1998-99 period. Those are the major requirement years of the CIP. Beyond 1998-99, we suggest a return to revenue bond financing only.

TABLE 7

DEBT SERVICE ANALYSIS ASSUMPTIONS
AND PROJECTION OF CONSTRUCTION EXPENDITURES

MAJOR ASSUMPTIONS							
	TERM	INTEREST	UNDRWRTR	MISC ISSUE	RESERVE	INTEREST	SIZING
	[YEARS]	COST	DISCOUNT	COSTS	FUND	EARNINGS	FACTOR
GENERAL OBLIGATION BONDS	30	6.50%	0.00%	0.25%	0.00%	N/A	100.25%
WATER REVENUE BONDS	30	7.00%	1.50%	0.50%	5.00%	5.00%	105.50%
CERTIFICATES OF PARTICIPATION	30	7.25%	1.50%	0.50%	5.00%	5.00%	105.50%
COMMERCIAL PAPER	270 DAYS	5.00%	N/A	N/A	N/A	N/A	N/A

PROJECTION OF CONSTRUCTION EXPENDITURES
[IN 000'S]

CATEGORY OF EXPENDITURE	FISCAL YEAR									
	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01
WATER SUPPLY FACILITIES	89,655	92,690	172,033	387,827	535,238	374,716	331,674	359,936	53,242	0
WATER DISTRIBUTION FACILITIES	91,177	13,253	15,131	50,704	131,275	173,574	107,208	37,992	0	0
WATER TREATMENT FACILITIES	92,185	107,883	140,433	104,769	134,578	255,033	229,779	24,681	8,865	0
INFO/CONTROL/COMMUNICATIONS	6,003	12,205	2,706	0	0	0	0	0	0	0
POWER FACILITIES	8,191	11,300	2,409	0	0	0	0	0	0	0
PROPERTY/FACILITIES/EQUIP MGMT	11,306	15,804	7,482	1,006	0	0	0	0	0	0
FACILITIES PLANNING	10,179	6,289	15,371	6,783	0	0	0	0	0	0
REHABILITATION TREATMENT	2,794	7,875	25,909	39,070	44,974	51,370	58,964	67,541	76,458	0
TOTAL	311,490	267,299	381,474	590,159	846,065	854,693	727,625	490,150	138,565	113,337

NOTES

- [1] EXPENDITURES FOR THE YEARS BEYOND 1991-92 FOR PROJECTS WHICH DO NOT HAVE FULL FUNDING HAVE BEEN ESCALATED AT 5% COMPOUNDED ANNUALLY
- [2] EXPENDITURES DO NOT INCLUDE CONTINGENCIES
- [3] EXPENDITURES DO NOT INCLUDE THE POSSIBLE ACQUISITION OF THE SOUTH COUNTY PIPELINE (SANTA MARGARITA PIPELINE) AND ALLEN MCCOLLOCH PIPELINE
- [4] SOURCE METROPOLITAN WATER DISTRICT - DATED 6/4/91
- [5] BREAKDOWN BY CATEGORY BEYOND FY 2000 IS NOT CURRENTLY AVAILABLE

TABLE 7 (Continued)

DEBT SERVICE ANALYSIS ASSUMPTIONS
AND PROJECTION OF CONSTRUCTION EXPENDITURES

MAJOR ASSUMPTIONS							
	TERM	INTEREST	UNDRWRTR	MISC ISSUE	RESERVE	INTEREST	SIZING
	[YEARS]	COST	DISCOUNT	COSTS	FUND	EARNINGS	FACTOR
GENERAL OBLIGATION BONDS	30	6.50%	0.00%	0.25%	0.00%	N/A	100.25%
WATER REVENUE BONDS	30	7.00%	1.50%	0.50%	5.00%	5.00%	105.50%
CERTIFICATES OF PARTICIPATION	30	7.50%	1.50%	0.50%	5.00%	5.00%	105.50%
COMMERCIAL PAPER	270 DAYS	5.00%	N/A	N/A	N/A	N/A	N/A

PROJECTION OF CONSTRUCTION EXPENDITURES
[IN 000'S]

CATEGORY OF EXPENDITURE	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	TOTAL
WATER SUPPLY FACILITIES	0	0	0	0	0	0	0	0	0	2,397,011
WATER DISTRIBUTION FACILITIES	0	0	0	0	0	0	0	0	0	620,314
WATER TREATMENT FACILITIES	0	0	0	0	0	0	0	0	0	1,098,206
INFO/CONTROL/COMMUNICATIONS	0	0	0	0	0	0	0	0	0	20,914
POWER FACILITIES	0	0	0	0	0	0	0	0	0	21,900
PROPERTY/FACILITIES/EQUIP MGMT	0	0	0	0	0	0	0	0	0	35,598
FACILITIES PLANNING	0	0	0	0	0	0	0	0	0	38,622
REHABILITATION TREATMENT	0	0	0	0	0	0	0	0	0	374,955
TOTAL	249,389	234,272	115,974	92,266	38,090	64,742	127,184	104,362	81,265	5,828,401

NOTES

- [1] EXPENDITURES FOR THE YEARS BEYOND 1991-92 FOR PROJECTS WHICH DO NOT HAVE FULL FUNDING HAVE BEEN ESCALATED AT 5% COMPOUNDED ANNUALLY
- [2] EXPENDITURES DO NOT INCLUDE CONTINGENCIES
- [3] EXPENDITURES DO NOT INCLUDE THE POSSIBLE ACQUISITION OF THE SOUTH COUNTY PIPELINE (SANTA MARGARITA PIPELINE) AND ALLEN MCCOLLOCH PIPELINE
- [4] SOURCE METROPOLITAN WATER DISTRICT - DATED 6/4/91
- [5] BREAKDOWN BY CATEGORY BEYOND FY 2000 IS NOT CURRENTLY AVAILABLE

TABLE 8

PROPOSED DEBT SERVICE ISSUANCE
[IN 000'S]

SOURCE OF FUNDING	FISCAL YEAR									
	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01
GENERAL OBLIGATION BONDS										
REQUIRED PROCEEDS	0	0	0	0	0	0	0	0	0	0
ISSUE SIZE	0	0	0	0	0	0	0	0	0	0
WATER REVENUE BONDS										
REQUIRED PROCEEDS	0	300,000	230,000	100,000	100,000	100,000	180,000	190,000	86,000	65,000
ISSUE SIZE	0	347,825	242,650	105,500	105,500	105,500	189,900	200,450	90,730	68,575
CERTIFICATES OF PARTICIPATION										
REQUIRED PROCEEDS	0	0	100,000	440,000	700,000	700,000	500,000	250,000	0	0
ISSUE SIZE	0	0	105,500	464,200	738,500	738,500	527,500	263,750	0	0
PAY-AS-YOU-GO										
CURRENT REVENUES	33,700	5,600	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
COMMERCIAL PAPER	0	0	0	0	0	0	0	0	0	0
TOTAL PROCEEDS AVAILABLE	33,700	305,600	380,000	590,000	850,000	850,000	730,000	490,000	136,000	115,000
TOTAL DEBT ISSUED	0	347,825	348,150	569,700	844,000	844,000	717,400	464,200	90,730	68,575
BEGINNING BALANCE	242,000	(35,790)	2,574	1,127	992	5,051	367	2,810	2,727	166
ADDITIONAL FUNDING	33,700	305,600	380,000	590,000	850,000	850,000	730,000	490,000	136,000	115,000
EXPENDITURES	311,490	267,299	381,474	590,159	846,065	854,693	727,625	490,150	138,565	113,337
INTEREST EARNINGS	0	63	27	24	123	9	69	67	4	46
OPERATING TRANSFERS IN/OUT	0	0	0	0	0	0	0	0	0	0
ENDING BALANCE	(35,790)	2,574	1,127	992	5,051	367	2,810	2,727	166	1,874

TABLE 8 (Continued)

PROPOSED DEBT SERVICE ISSUANCE
[IN 000'S]

SOURCE OF FUNDING	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	TOTAL
GENERAL OBLIGATION BONDS										
REQUIRED PROCEEDS	0	0	0	0	0	0	0	0	0	0
ISSUE SIZE	0	0	0	0	0	0	0	0	0	0
WATER REVENUE BONDS										
REQUIRED PROCEEDS	200,000	185,000	65,000	45,000	0	0	75,000	55,000	30,000	2,006,000
ISSUE SIZE	211,000	195,175	68,575	47,475	0	0	79,125	58,025	31,650	2,147,655
CERTIFICATES OF PARTICIPATION										
REQUIRED PROCEEDS	0	0	0	0	0	0	0	0	0	2,690,000
ISSUE SIZE	0	0	0	0	0	0	0	0	0	2,837,950
PAY-AS-YOU-GO										
CURRENT REVENUES	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	889,300
COMMERCIAL PAPER	0	0	0	0	0	0	0	0	0	0
TOTAL PROCEEDS AVAILABLE	250,000	235,000	115,000	95,000	50,000	50,000	125,000	105,000	80,000	5,585,300
TOTAL DEBT ISSUED	211,000	195,175	68,575	47,475	0	0	79,125	58,025	31,650	4,985,605
BEGINNING BALANCE	1,874	2,548	3,357	2,443	5,306	17,647	2,977	813	1,488	NA
ADDITIONAL FUNDING	250,000	235,000	115,000	95,000	50,000	50,000	125,000	105,000	80,000	5,585,300
EXPENDITURES	249,389	234,272	115,974	92,266	38,090	64,742	127,184	104,362	81,265	5,828,401
INTEREST EARNINGS	62	82	60	129	430	73	20	36	6	1,329
OPERATING TRANSFERS IN/OUT	0	0	0	0	0	0	0	0	0	0
ENDING BALANCE	2,548	3,357	2,443	5,306	17,647	2,977	813	1,488	228	NA

TABLE 9

**PROJECTED PAYGO & DEBT SERVICE EXPENDITURES
[IN 000'S]**

NET DEBT SERVICE/TYPE OF DEBT	FISCAL YEAR									
	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01
GENERAL OBLIGATION BONDS	0	0	0	0	0	0	0	0	0	0
WATER REVENUE BONDS	0	0	46,259	54,511	62,763	71,015	85,868	101,547	108,643	114,007
CERTIFICATES OF PARTICIPATION	0	0	8,453	45,644	104,812	163,981	206,244	227,375	227,375	227,375
PAY-AS-YOU-GO	33,700	5,600	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
EXISTING G.O. DEBT SERVICE [1]	57,924	57,974	57,737	57,522	57,452	57,380	57,464	57,470	57,323	50,129
EXISTING WATER REV DEBT SERVICE [2]	36,168	49,424	49,422	49,421	49,391	49,401	49,379	49,395	49,409	49,407
COMMERCIAL PAPER	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
TOTAL EXPENDITURES	127,793	112,999	211,871	257,099	324,418	391,777	448,955	485,788	492,750	490,919

[1] SOURCE - SEREIS "G" GENERAL OBLIGATION OFFICIAL STATEMENT

[2] SOURCE - JULY 1991 OFFICIAL STATEMENT

TABLE 10

**PROPOSED DEBT SERVICE EXPENDITURES
[IN 000'S]**

CATEGORY / FISCAL YEAR ENDING	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
GENERAL OBLIGATION DEBT SERVICE	0	0	0	0	0	0	0	0	0	0
WATER REVENUE										
DEBT SERVICE	0	28,030	47,584	56,086	64,588	73,090	88,393	104,547	111,858	117,385
RESERVE FUND EARNINGS	0	750	1,325	1,575	1,825	2,075	2,525	3,000	3,215	3,378
NET DEBT SERVICE	0	0	46,259	54,511	62,763	71,015	85,868	101,547	108,643	114,007
CERTIFICATES OF PARTICIPATION										
DEBT SERVICE	0	0	8,716	47,068	108,083	169,098	212,679	234,470	234,470	234,470
RESERVE FUND EARNINGS	0	0	264	1,424	3,271	5,117	6,436	7,095	7,095	7,095
NET DEBT SERVICE	0	0	8,453	45,644	104,812	163,981	206,244	227,375	227,375	227,375
COMMERCIAL PAPER										
OUTSTANDING BALANCE	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
INTEREST COST	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
PRINCIPAL PAYOUT	0	0	0	0	0	0	0	0	0	0
GROSS DEBT SERVICE	3,000	31,030	59,301	106,155	175,671	245,187	304,073	342,017	349,329	354,855
CAPTAUZED INTEREST	0	27,280	0	0	0	0	0	0	0	0
NET DEBT SERVICE	3,000	3,000	57,712	103,155	170,576	237,996	295,112	331,922	339,019	344,383

TABLE 9 (Continued)

PROJECTED PAYGO & DEBT SERVICE EXPENDITURES
[IN 000'S]

NET DEBT SERVICE/TYPE OF DEBT	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	TOTAL
GENERAL OBLIGATION BONDS	0	0	0	0	0	0	0	0	0	0
WATER REVENUE BONDS	130,511	145,777	151,141	154,854	154,854	154,854	161,043	165,581	168,057	2,031,284
CERTIFICATES OF PARTICIPATION	227,375	227,375	227,375	227,375	227,375	227,375	227,375	227,375	227,375	3,257,640
PAY-AS-YOU-GO	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	889,300
EXISTING G.O. DEBT SERVICE [1]	50,094	50,040	50,042	50,046	50,014	50,051	50,035	50,049	49,959	1,018,707
EXISTING WATER REV DEBT SERVICE [2]	49,414	49,416	49,395	49,390	49,392	49,429	49,498	49,434	49,483	925,670
COMMERCIAL PAPER	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	57,000
TOTAL EXPENDITURES	507,395	522,608	527,953	531,666	531,636	531,709	537,952	542,440	544,875	8,122,601

99

TABLE 10 (Continued)

PROPOSED DEBT SERVICE EXPENDITURES
[IN 000'S]

CATEGORY / FISCAL YEAR ENDING	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL DS
GENERAL OBLIGATION DEBT SERVICE	0	0	0	0	0	0	0	0	0	0
WATER REVENUE DEBT SERVICE	134,388	150,117	155,643	159,469	159,469	159,469	165,845	170,521	173,072	2,119,554
RESERVE FUND EARNINGS	3,878	4,340	4,503	4,615	4,615	4,615	4,803	4,940	5,015	60,990
NET DEBT SERVICE	130,511	145,777	151,141	154,854	154,854	154,854	161,043	165,581	168,057	2,031,284
CERTIFICATES OF PARTICIPATION DEBT SERVICE	234,470	234,470	234,470	234,470	234,470	234,470	234,470	234,470	234,470	3,359,289
RESERVE FUND EARNINGS	7,095	7,095	7,095	7,095	7,095	7,095	7,095	7,095	7,095	101,649
NET DEBT SERVICE	227,375	227,375	227,375	227,375	227,375	227,375	227,375	227,375	227,375	3,257,640
COMMERCIAL PAPER										
OUTSTANDING BALANCE	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	1,140,000
INTEREST COST	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	57,000
PRINCIPAL PAYOUT	0	0	0	0	0	0	0	0	0	0
GROSS DEBT SERVICE	371,859	387,587	393,113	396,939	396,939	396,939	403,316	407,992	410,542	5,535,843
CAPITALIZED INTEREST	0	0	0	0	0	0	0	0	0	27,280
NET DEBT SERVICE	360,886	376,152	381,516	385,229	385,229	385,229	391,418	395,957	398,432	5,345,924

Table 8 shows about \$1.3 billion in revenue bond issuance during the same period that COPs are sold. With the currently outstanding revenue bonds, total revenue bond debt by fiscal year 1998-99 would reach just under \$2.0 billion, less than current system equity which should increase by that time. Thereafter, Table 8 shows an additional \$848 million in revenue bonds. It is assumed that annual equity additions will enable revenue bond debt of that magnitude to be sold.

For planning purposes, it is assumed that bonds will be sold annually at the beginning of the year to meet requirements for that year. Metropolitan could schedule more or less frequent issuance depending upon market conditions. The assumption has led to the need for \$300,000,000 in net revenue bond proceeds for fiscal year 1992-93. It is assumed that interest on that issue will be capitalized for only one year in order to satisfy cash flow needs. While staff has indicated a potential two-year capitalization of interest, it is recommended that only one year be capitalized in order to preserve debt capacity.

Tables 9 and 10 summarize the annual debt service requirements related to the CIP financing plan. Table 9 shows that total annual Metropolitan debt service will reach \$500,000,000 by the year 2010.

Sensitivity Analysis

Using the financing plan developed, a sensitivity analysis was performed by varying the term of debt to 20 and 25 year maturities. The analysis yielded the results shown in Table 11.

TABLE 11

RESULTS OF SENSITIVITY ANALYSIS

Term of Bonds	Average Annual Debt Service	Maximum Annual Debt Service	Total Debt Service
20 years	\$471,204	\$608,363	\$10,405,962
25 years	\$443,779	\$568,842	\$11,722,472
30 years	\$427,505	\$544,875	\$13,115,564

(1) Does not include the debt service on currently outstanding bonds

Obviously, the scenarios presented do not cover the entire realm of possibilities, the intent being to illustrate the advantages and disadvantages of shorter terms on future borrowings. As Table 11 demonstrates, by utilizing a 20 year term on future debt issuance, Metropolitan would save 20 percent on the total financing cost. In addition,

balance sheet acquisition of assets would be 30 percent faster. The main disadvantage of a shorter term is additional annual cost. Debt service would be 10 percent greater, requiring greater rate increases. We suggest that Metropolitan initially issue 30 year debt. Once revenues stabilize, debt with shorter maturities may be used without significantly adverse rate impacts.

RECOMMENDATIONS

- It should be legally determined that issuance of COPs is not subject to revenue bond debt/equity limitation as soon as practical to allow for the incorporation of this debt mechanism into Metropolitan's financial planning process.
- The Board should consider adopting a long term (i.e., 10 years) CIP. This would provide staff with better input for incorporating the priorities of the Board into future capital plans. This would also enhance the ability of future water rates to anticipate any increased revenue requirements.
- Metropolitan should maintain its continuing dialogue with the bond rating agencies as the CIP plan is implemented to ensure the preservation of its credit rating.
- Due to the magnitude of capital expenditures required over the next decade, Metropolitan should consider the use of surety policies in place of fully funded debt service reserve funds.
- Metropolitan should consider shortening the maturity on some future debt issues to 20 or 25 years. This would reduce total financing costs and accelerate the accumulation of assets for Metropolitan. The increased annual debt service cost would need to be evaluated against potential greater rate adjustments.
- Metropolitan should retain its current general obligation bonding capacity (unless additional general obligation approval is obtained) should the need arise to access the credit markets quickly.

REVENUE PROGRAM

A revenue program for Metropolitan has to address not only alternative revenue sources but also supply and demand issues which impact water revenues, reserve requirements, the capital financing plan, and incentive programs.

APPROACH TO REVENUE PROGRAM DEVELOPMENT

Previous sections of this report have reviewed these considerations separately. In this section, these areas are integrated in order to give direction to Metropolitan planning. It is not the purpose here to provide a comprehensive, top-to-bottom strategic or financial plan for Metropolitan. Rather, the approach is to take existing programs, financial plans, and projections, and to focus attention on specific areas where benefits may be realized.

With this in mind, the following items are included in the development of a proposed revenue program for Metropolitan:

- the currently proposed standby and service availability charges,
- taxes at the full level authorized under the MWD Act,
- connection charges on new retail customers,
- adequate working capital reserves
- PAYGO funded by connection charges,
- the continuation of all incentive programs,
- an examination of the impact of the Seasonal Storage Program, and
- financing alternatives for the capital improvement program.

In order to evaluate the impact on the net revenues of each of these items, existing Metropolitan cost projections are used as a base case. These base case projections represent the most current developed by Metropolitan which served as the basis for the adopted fiscal year 1992-93 budget. However, because Metropolitan is continually making adjustments and refinements as more information becomes available, these projections are considered to be preliminary and for discussion purposes only with respect to this study. Before implementation of any new revenue program, Metropolitan must thoroughly update all financial and operational assumptions as it routinely does.

The following key assumptions are made for the revenue programs in this study:

- the Local Projects Program, Groundwater Recovery Program, and Conservation Credits Program payments continue;
- interest on revenue bonds issued in 1993 is capitalized for only one year;
- the PAYGO expenditure level is assumed to be funded by the proceeds of the connection charges collected annually, beginning in fiscal year 1993-94;
- the Board's current policy of funding 20 percent of capital expenditures from PAYGO is rescinded;
- beginning in fiscal year 1993-94, taxes are set at the maximum level allowed by Metropolitan's policy, approximately \$98 million;
- standby charges and availability of service charges collected are \$25 million each beginning in 1992-93 and continue indefinitely in addition to the connection charges, and
- the working capital reserve requirement has been determined to be the amount of revenues associated with 500,000 acre-feet of water sales, \$25 million for emergencies, and 45 days operation and maintenance expense. It is to be funded by planned annual revenue increases.

Water rates are considered revenue neutral with respect to these assumptions.

Seasonal Storage

The discount offered under the current seasonal storage rate causes the basic non-interruptible rate to be higher than it would otherwise be. In order to evaluate the rate impact of the seasonal storage program, the level of the noninterruptible rate which results from the revenue program implementation is examined both with and without the seasonal storage program.

Table 12 presents projected revenue requirements for Metropolitan from fiscal year 1992-93 to 2009-2010. Data for the years 1990 and 1991 are shown for comparison purposes. The source of the data is Metropolitan working documents. All numbers remain unchanged from the May 29 version of those documents except for the following:

- Additional Revenue Bond Debt Service is from Table 10 in this report.
- Certificates of Participation is from the same table
- PAYGO is set at \$50 million per year, matching connection charges.
- Taxes are set at the maximum level beginning fiscal year 1993-94.

TABLE 12
METROPOLITAN WATER DISTRICT
PROJECTED REVENUE REQUIREMENTS

Cash Basis
[IN 000'S]

	Actual	Fiscal Years								
	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00
STATE WATER PROJECT SUPPLY										
SWP CAPITAL	104,521	118,426	129,270	127,832	128,505	128,662	128,650	128,624	128,626	128,662
KERN WATER BANK -Capital	0	0	3,400	3,400	3,400	3,400	3,400	3,400	3,400	3,400
SWP OMP&R	67,407	80,388	94,857	103,731	110,130	114,992	120,859	129,746	133,432	138,596
OFF-AQUEDUCT	104,402	102,402	104,000	110,058	112,124	112,323	115,504	116,889	116,481	112,850
SWP VARIABLE POWER	26,148	15,886	21,654	62,312	62,066	60,342	59,083	62,050	68,062	97,679
ARVIN-EDISON O&M	0	0	1,000	2,142	2,284	2,426	2,568	2,710	2,852	3,000
KERN WATER BANK -O&M	0	0	230	230	230	230	230	230	230	230
SWP CREDITS	(33,769)	(60,885)	(20,000)	(20,000)	(20,000)	(20,000)	(20,000)	(20,000)	(20,000)	(20,000)
TOTAL STATE WATER PROJECT SUPPLY	288,709	256,217	334,411	389,705	398,739	402,375	410,294	423,649	433,083	464,417
STATE WATER BANK PURCHASE & POWER	28,219	40,013	800	24,000	48,000	72,000	72,000	72,000	72,000	24,000
COLORADO RIVER SUPPLIES										
CRA POWER	22,579	28,851	36,140	2,307	7,147	10,561	14,725	18,446	21,621	22,126
IID I CAPITAL	35,688	19,441	14,031	19,695	0	0	0	0	0	0
IID I O&M & INDIRECT	5,731	5,288	7,031	6,981	7,017	2,538	2,665	2,798	2,938	3,085
ADD'L CRA SUPPLIES: CAPITAL	0	0	2,100	31,627	91,280	129,746	62,632	30,444	0	0
ADD'L CRA SUPPLIES: O&M	0	0	14,000	10,100	7,202	16,234	18,093	19,849	21,749	22,161
TOTAL CRA SUPPLY	63,998	53,580	73,302	70,710	112,646	159,079	98,115	71,537	46,308	47,372
WATER MANAGEMENT PROGRAMS										
LOCAL PROJECTS RECLAIMED WATER	2,267	3,743	3,620	6,036	8,799	11,955	13,698	16,819	19,910	25,315
GROUNDWATER CLEAN-UP	0	0	3,100	11,100	16,700	20,300	23,000	27,200	29,900	36,300
DESALINIZATION	0	0	0	0	0	5,000	5,000	5,000	5,000	5,000
CONSERVATION CREDITS PROGRAM	4,900	14,951	21,263	23,389	25,728	28,301	31,131	34,244	37,669	41,436
TOTAL WATER MANAGEMENT PROGRAMS	7,167	18,694	27,983	40,525	51,227	65,556	72,829	83,263	92,479	108,051
MWD CAPITAL PROGRAM										
CURRENT REVENUE BONDS	26,607	34,878	49,424	49,422	49,421	49,391	49,401	49,379	49,395	49,409
ADDITIONAL REVENUE BONDS	0	0	0	46,259	54,511	62,763	71,015	85,868	101,547	108,643
G.O. BOND DEBT SERVICE	58,152	57,924	57,974	57,737	57,523	57,451	57,379	57,464	57,471	57,323
ADDITIONAL G.O. BONDS	0	0	0	0	0	0	0	0	0	0
COMMERCIAL PAPER DIS & COSTS	0	2,500	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
PAY-AS-YOU-GO	70,644	50,000	7,400	50,000	50,000	50,000	50,000	50,000	50,000	50,000
1ST AQUEDUCT DEBT SERVICE	220	215	210	204	150	0	0	0	0	0
CERTIFICATES OF PARTICIPATION	0	0	0	8,453	45,644	104,812	163,981	206,244	227,375	227,375
TOTAL MWD CAPITAL PROGRAM	155,623	145,517	118,008	215,075	260,249	327,417	394,776	451,955	488,788	495,750
MWD O&M	156,043	178,257	195,460	217,750	244,412	274,728	309,942	348,415	388,702	435,949
LEASE OBLIGATIONS	1,468	4,310	6,798	8,779	9,300	9,430	8,315	8,033	10,519	11,179
OZONE O&M	0	0	0	0	0	9,000	9,000	9,450	10,419	12,061
OPER EQUIP & CHANGE IN INVENTORY	4,841	6,739	13,031	18,000	18,000	18,000	18,000	18,000	18,000	18,000
TOTAL COSTS	686,068	703,327	769,793	984,544	1,142,573	1,337,585	1,393,271	1,486,302	1,560,298	1,616,779
ADJUSTMENTS IN RESERVES	32,100	26,044	9,783	16,793	5,714	3,436	11,142	15,652	13,890	14,327
TOTAL COSTS & OBLIGATIONS	718,168	729,371	779,576	1,001,337	1,148,287	1,341,021	1,404,413	1,501,954	1,574,188	1,631,106
LESS:										
POWER REVENUES	17,733	20,000	20,000	20,000	24,000	24,000	24,000	24,000	24,000	24,000
INTEREST INCOME	53,765	51,774	40,000	41,000	42,000	43,000	45,000	45,000	47,000	48,000
MISC. INCOME	486	750	750	750	750	750	750	750	750	750
TAXES	86,315	77,000	85,000	98,329	98,022	97,748	97,123	96,389	95,881	95,500
STABILIZATION FUNDS	122,000	213,000	94,638	51,000	0	0	0	0	0	0
OTHER REVENUE:										
STAND BY CHARGES	0	0	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
SERVICE CHARGES	0	0	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
CONNECTION CHARGES	0	0	0	50,000	50,000	50,000	50,000	50,000	50,000	50,000
TOTAL WATER REVENUE REQUIREMENT	437,869	366,847	489,188	690,258	883,515	1,075,523	1,137,540	1,235,815	1,306,557	1,362,856
CAPITAL PROJECTS PROGRAM	270,501	311,490	267,299	381,474	590,159	846,065	854,693	727,625	490,150	138,565

Source of data: MWD working document dated May 29, 1992. Modified to reflect financing alternatives, alternative revenue sources, and taxes at maximum.

TABLE 12 (Continued)
 METROPOLITAN WATER DISTRICT
 PROJECTED REVENUE REQUIREMENTS

Cash Basis
 [IN 000'S]

	Fiscal Years									
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
STATE WATER PROJECT SUPPLY										
SWP CAPITAL	128,685	128,711	128,741	128,771	128,797	128,820	128,853	128,881	128,905	139,813
KERN WATER BANK -Capital	3,400	3,400	3,400	3,400	3,400	3,400	3,400	3,400	3,400	3,400
SWP OMP&R	148,291	155,105	160,842	169,656	180,316	189,933	198,899	207,619	218,391	229,797
OFF-AQUEDUCT	109,677	109,819	107,632	105,230	101,033	97,448	96,486	93,252	89,653	84,532
SWP VARIABLE POWER	87,859	119,673	128,904	144,266	155,501	154,522	161,462	171,932	176,850	179,518
ARVIN-EDISON O&M	0	0	0	0	0	0	0	0	0	0
KERN WATER BANK -O&M	230	230	230	230	230	230	230	230	230	230
SWP CREDITS	(20,000)	(20,000)	(20,000)	(20,000)	(20,000)	(20,000)	(20,000)	(20,000)	(20,000)	(20,000)
TOTAL STATE WATER PROJECT SUPPLY	458,142	496,938	509,749	531,553	549,277	554,353	569,330	585,314	597,429	617,290
STATE WATER BANK: PURCHASE & POWER	72,000	0								
COLORADO RIVER SUPPLIES										
CRA POWER	22,217	22,534	22,867	23,216	23,583	23,968	24,372	24,797	25,243	26,681
IID I CAPITAL	0	0	0	0	0	0	0	0	0	0
IID I O&M & INDIRECT	3,239	3,401	3,571	3,750	3,937	4,134	4,341	4,558	4,786	5,025
ADD'L CRA SUPPLIES: CAPITAL	0	0	0	0	0	0	0	0	0	0
ADD'L CRA SUPPLIES: O&M	29,905	31,400	32,970	34,619	36,350	38,167	40,075	42,079	44,183	46,392
TOTAL CRA SUPPLY	55,361	57,335	59,408	61,585	63,870	66,269	68,788	71,434	74,212	78,098
WATER MANAGEMENT PROGRAMS										
LOCAL PROJECTS RECLAIMED WATER	25,315	25,315	25,315	25,315	25,315	25,315	25,315	25,315	25,315	25,315
GROUNDWATER CLEAN-UP	39,654	38,800	38,063	37,271	36,570	36,001	35,577	35,248	35,019	35,838
DESALINIZATION	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
CONSERVATION CREDITS PROGRAM	41,436	41,436	41,436	41,436	41,436	41,436	41,436	41,436	41,436	41,436
TOTAL WATER MANAGEMENT PROGRAMS	111,405	110,551	109,814	109,022	108,321	107,752	107,328	106,999	106,770	107,589
MWD CAPITAL PROGRAM										
CURRENT REVENUE BONDS	49,407	49,414	49,416	49,395	49,390	49,392	49,429	49,498	49,434	49,483
ADDITIONAL REVENUE BONDS	114,007	130,511	145,777	151,141	154,854	154,854	154,854	161,043	165,581	168,057
G.O. BOND DEBT SERVICE	50,129	50,095	50,040	50,042	50,047	50,015	50,051	50,036	50,049	49,960
ADDITIONAL G.O. BONDS	0	0	0	0	0	0	0	0	0	0
COMMERCIAL PAPER DIS & COSTS	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
PAY-AS-YOU-GO	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
1ST AQUEDUCT DEBT SERVICE	0	0	0	0	0	0	0	0	0	0
CERTIFICATES OF PARTICIPATION	227,375	227,375	227,375	227,375	227,375	227,375	227,375	227,375	227,375	227,375
TOTAL MWD CAPITAL PROGRAM	493,918	510,395	525,608	530,953	534,666	534,636	534,709	540,952	545,439	547,875
MWD O&M	489,604	549,698	617,004	692,386	776,813	871,372	977,279	1,095,893	1,228,742	1,377,533
LEASE OBLIGATIONS	11,179	11,179	11,179	11,179	11,179	11,179	11,179	11,179	11,179	11,179
OZONE O&M	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
OPER EQUIP & CHANGE IN INVENTORY	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000
TOTAL COSTS	1,724,609	1,769,096	1,865,762	1,969,677	2,077,126	2,178,561	2,301,613	2,444,771	2,596,772	2,772,564
ADJUSTMENTS IN RESERVES	18,435	9,265	17,215	18,554	17,400	22,116	18,386	30,808	28,294	29,992
TOTAL COSTS & OBLIGATIONS	1,743,044	1,778,361	1,882,977	1,988,231	2,094,526	2,200,677	2,319,999	2,475,579	2,625,066	2,802,556
LESS:										
POWER REVENUES	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000
INTEREST INCOME	48,000	48,000	48,000	48,000	50,000	50,000	50,000	50,000	50,000	50,000
MISC. INCOME	750	750	750	750	750	750	750	750	750	750
TAXES	88,086	87,770	87,590	87,682	87,601	87,234	86,953	86,755	86,750	86,527
STABILIZATION FUNDS	0	0	0	0	0	0	0	0	0	0
OTHER REVENUE:										
STAND BY CHARGES	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
SERVICE CHARGES	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
CONNECTION CHARGES	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
TOTAL WATER REVENUE REQUIREMENT	1,482,208	1,517,841	1,622,637	1,727,799	1,832,175	1,938,693	2,058,296	2,214,074	2,363,566	2,541,279
CAPITAL PROJECTS PROGRAM	113,337	249,389	234,272	115,974	92,266	38,090	64,742	127,184	104,362	81,265

Source of data: MWD working document dated May 29, 1992. Modified to reflect financing alternatives, alternative revenue sources, and taxes at maximum.

- Standby and service charges continue at \$25 million each per year.
- Connection charges bring in \$50 million per year beginning in 1993-94.
- Adjustments in Reserves does not include working capital increases.

The table shows that net revenue required from water rates, excluding reserves, increases from \$489.188 million in fiscal year 1992-93 to \$690.258 million in 1993-94. This is an increase of 41 percent. From that point, the indicated annual percentage increases are lower.

This base case scenario discussed above is termed Alternative A on the rate development tables presented in the next sections. Three additional scenarios have been developed in order to provide some indication of the potential range of rate adjustments facing Metropolitan. Alternative B assumes that standby charges do not continue past fiscal year 1993-94. Alternative C assumes that a connection charge is not implemented; however, the standby and service charge continues indefinitely at the proposed levels. Finally, Alternative D assumes no new revenue from either a standby charge or a connection charge.

RATES WITH SEASONAL STORAGE

Table 13 presents the required water rates and annual adjustments necessary to meet the indicated requirements plus \$25 million per year additional working capital, assuming a continuation of the seasonal storage program. Metropolitan staff have estimated that 25 percent of water sales will occur under the program. Rates are based on assumed sales of 2,014,000 acre-feet next fiscal year, increasing to 2,550,000 acre-feet by 2003. Rates are shown to increase and decrease from year to year by varying amounts. The fiscal year 1992-93 adjustment of \$47 per acre-foot is indicated to exactly match requirements as budgeted.

Table 14 presents the same basic rate development with rate adjustments smoothed to avoid most large swings and any decreases. The additional revenues generated by smoothing the rate increases have been used to fund working capital to target levels.

For fiscal years 1993-94 through 1995-96, revenue requirements are increasing at a rapid rate in order to finance the CIP. It is not recommended that these required increases be magnified further by the addition of working capital to target levels. Rather, beginning in fiscal year 1995-96 when the need for annual rate increases begins to moderate, Metropolitan could adopt continuing rate adjustments which would very quickly generate the necessary revenue. It is recognized that such an approach could leave Metropolitan vulnerable to revenue shortfalls for the next several years.

Figure 7 shows the indicated calculated and smoothed water rates for the period 1992 through 2000 with the continuation of the seasonal storage program. The figure clearly shows that rates will need to reach \$544 per acre-foot by the year 2000 under

TABLE 13

CURRENT AND PROJECTED WATER RATES
WITH SEASONAL STORAGE
[IN 000'S]

	FISCAL YEAR									
	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	
REVENUE REQUIREMENTS		\$489,188	\$690,258	\$883,515	\$1,075,523	\$1,137,540	\$1,235,815	\$1,306,557	\$1,362,856	
REVENUE RECOVERY										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED		21,662	26,822	37,237	46,138	53,028	55,511	60,439	63,437	
TREATED		54,957	69,283	96,625	118,125	135,746	143,751	156,374	163,853	
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED		102,421	136,416	171,129	205,930	212,386	231,232	242,894	252,517	
TREATED		264,559	353,979	438,133	527,161	549,992	598,266	627,372	653,112	
SEASONAL										
UNTREATED		54,851	77,887	100,722	123,771	128,125	140,729	148,384	154,646	
TREATED		35,738	50,871	64,669	79,398	83,263	91,326	96,094	100,291	
TOTAL		\$534,188	\$715,258	\$908,515	\$1,100,523	\$1,162,540	\$1,260,815	\$1,331,557	\$1,387,856	
ANNUAL BALANCE		\$45,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	
SALES										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED		98	100	106	112	112	114	117	119	
TREATED		211	215	229	241	242	247	252	257	
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED		381	389	414	436	438	447	456	464	
TREATED		822	840	894	941	945	964	983	1,002	
SEASONAL										
UNTREATED		327	334	356	375	377	384	392	399	
TREATED		176	180	192	202	203	207	211	215	
TOTAL		2,014	2,058	2,192	2,306	2,317	2,363	2,410	2,456	
RATES										
UNTREATED NON-INTER. WATER RATE	\$222	\$269	\$351	\$413	\$472	\$485	\$518	\$533	\$544	
INCREASE OVER PRIOR YEAR	\$25	\$47	\$82	\$62	\$59	\$12	\$33	\$16	\$11	
TREATMENT SURCHARGE	\$39	\$53	\$71	\$77	\$88	\$97	\$103	\$105	\$108	
SEASONAL UNTREATED	\$130	\$168	\$233	\$283	\$330	\$340	\$366	\$379	\$387	
SEASONAL TREATED	\$154	\$203	\$282	\$337	\$393	\$411	\$442	\$456	\$467	
WORKING CAPITAL RESERVE FUND										
BEGINNING BALANCE		130,000	175,000	200,000	225,000	250,000	275,000	300,000	325,000	
ANNUAL BALANCE		45,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	
CUMULATIVE BALANCE		175,000	200,000	225,000	250,000	275,000	300,000	325,000	350,000	

TABLE 13 (Continued)

CURRENT AND PROJECTED WATER RATES
WITH SEASONAL STORAGE
[IN 000'S]

	FISCAL YEAR									
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
REVENUE REQUIREMENTS	\$1,482,208	\$1,517,841	\$1,622,637	\$1,727,799	\$1,832,175	\$1,938,693	\$2,058,296	\$2,214,074	\$2,363,566	\$2,541,279
REVENUE RECOVERY										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED	65,743	72,000	72,457	77,677	82,797	87,888	93,115	99,112	107,160	114,432
TREATED	170,039	184,671	186,748	198,812	210,660	222,446	234,525	248,265	266,431	282,922
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED	277,603	279,953	303,094	323,071	342,937	363,333	386,730	418,133	446,507	482,157
TREATED	712,017	721,537	775,756	821,987	867,977	915,109	968,720	1,039,602	1,103,952	1,184,002
SEASONAL										
UNTREATED	171,595	172,979	188,698	202,435	216,096	230,121	246,211	267,804	287,316	311,831
TREATED	110,211	111,701	120,884	128,817	136,708	144,796	153,995	166,158	177,200	190,935
TOTAL	\$1,507,208	\$1,542,841	\$1,647,637	\$1,752,799	\$1,857,175	\$1,963,693	\$2,083,296	\$2,239,074	\$2,388,566	\$2,566,279
ANNUAL BALANCE	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
SALES										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED	121	122	124	124	124	124	124	124	124	124
TREATED	261	264	267	267	267	267	267	267	267	267
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED	472	477	482	482	482	482	482	482	482	482
TREATED	1,018	1,030	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040
SEASONAL										
UNTREATED	405	410	414	414	414	414	414	414	414	414
TREATED	218	221	223	223	223	223	223	223	223	223
TOTAL	2,495	2,525	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550
RATES										
UNTREATED NON-INTER. WATER RATE	\$589	\$586	\$629	\$670	\$711	\$754	\$802	\$867	\$926	\$1,000
INCREASE OVER PRIOR YEAR	\$45	(\$2)	\$42	\$41	\$41	\$42	\$49	\$65	\$59	\$74
TREATMENT SURCHARGE	\$111	\$114	\$117	\$120	\$123	\$126	\$129	\$132	\$135	\$138
SEASONAL UNTREATED	\$423	\$422	\$455	\$489	\$521	\$555	\$594	\$646	\$693	\$753
SEASONAL TREATED	\$505	\$506	\$542	\$577	\$613	\$649	\$690	\$745	\$794	\$856
WORKING CAPITAL RESERVE FUND										
BEGINNING BALANCE	350,000	375,000	400,000	425,000	450,000	475,000	500,000	525,000	550,000	575,000
ANNUAL BALANCE	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
CUMULATIVE BALANCE	375,000	400,000	425,000	450,000	475,000	500,000	525,000	550,000	575,000	600,000

TABLE 14
CURRENT AND PROJECTED WATER RATES
WITH SEASONAL STORAGE
ALTERNATIVE A
[IN 000'S]

	FISCAL YEAR								
	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00
REVENUE REQUIREMENTS		\$489,188	\$690,258	\$883,515	\$1,075,523	\$1,137,540	\$1,235,815	\$1,306,557	\$1,362,856
REVENUE RECOVERY									
NON-INTERRUPTIBLE - JULY/AUGUST									
UNTREATED		21,662	26,822	36,534	46,813	55,456	57,702	60,017	62,352
TREATED		54,957	69,283	95,107	119,582	140,985	148,478	155,463	161,511
NON-INTERRUPTIBLE - BALANCE OF YEAR									
UNTREATED		102,421	133,838	173,633	215,359	220,767	229,617	238,740	252,583
TREATED		264,559	348,418	443,536	547,506	568,077	594,779	618,407	653,255
SEASONAL									
UNTREATED		54,851	76,115	102,443	130,254	133,888	139,618	145,528	154,691
TREATED		35,738	49,917	65,596	82,889	86,366	90,727	94,556	100,315
TOTAL		\$534,188	\$704,393	\$916,849	\$1,142,403	\$1,205,539	\$1,260,921	\$1,312,711	\$1,384,707
ANNUAL BALANCE		\$45,000	\$14,135	\$33,334	\$66,880	\$67,999	\$25,106	\$6,154	\$21,851
SALES									
NON-INTERRUPTIBLE - JULY/AUGUST									
UNTREATED		98	100	106	112	112	114	117	119
TREATED		211	215	229	241	242	247	252	257
NON-INTERRUPTIBLE - BALANCE OF YEAR									
UNTREATED		381	389	414	436	438	447	456	464
TREATED		822	840	894	941	945	964	983	1,002
SEASONAL									
UNTREATED		327	334	356	375	377	384	392	399
TREATED		176	180	192	202	203	207	211	215
TOTAL		2,014	2,058	2,192	2,306	2,317	2,363	2,410	2,456
RATES									
UNTREATED NON-INTER. WATER RATE	\$222	\$269	\$344	\$419	\$494	\$504	\$514	\$524	\$544
INCREASE OVER PRIOR YEAR	\$25	\$47	\$75	\$75	\$75	\$10	\$10	\$10	\$20
TREATMENT SURCHARGE	\$39	\$53	\$71	\$77	\$88	\$97	\$103	\$105	\$108
SEASONAL UNTREATED	\$130	\$168	\$228	\$288	\$348	\$356	\$364	\$372	\$388
SEASONAL TREATED	\$154	\$203	\$277	\$342	\$411	\$426	\$439	\$448	\$467
WORKING CAPITAL RESERVE FUND									
BEGINNING BALANCE		130,000	175,000	189,135	222,469	289,349	357,348	382,454	388,608
ANNUAL BALANCE		45,000	14,135	33,334	66,880	67,999	25,106	6,154	21,851
CUMULATIVE BALANCE		175,000	189,135	222,469	289,349	357,348	382,454	388,608	410,459
WORKING CAPITAL RESERVE FUND TARGET									
EMERGENCY RESERVE		25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
SALES RESERVE		150,400	193,300	232,600	273,400	281,100	287,900	293,500	304,400
OPERATING RESERVE		24,098	26,846	30,133	33,871	38,212	42,955	47,922	53,747
TOTAL FUND TARGET		199,498	245,146	287,733	332,271	344,312	355,855	366,422	383,147

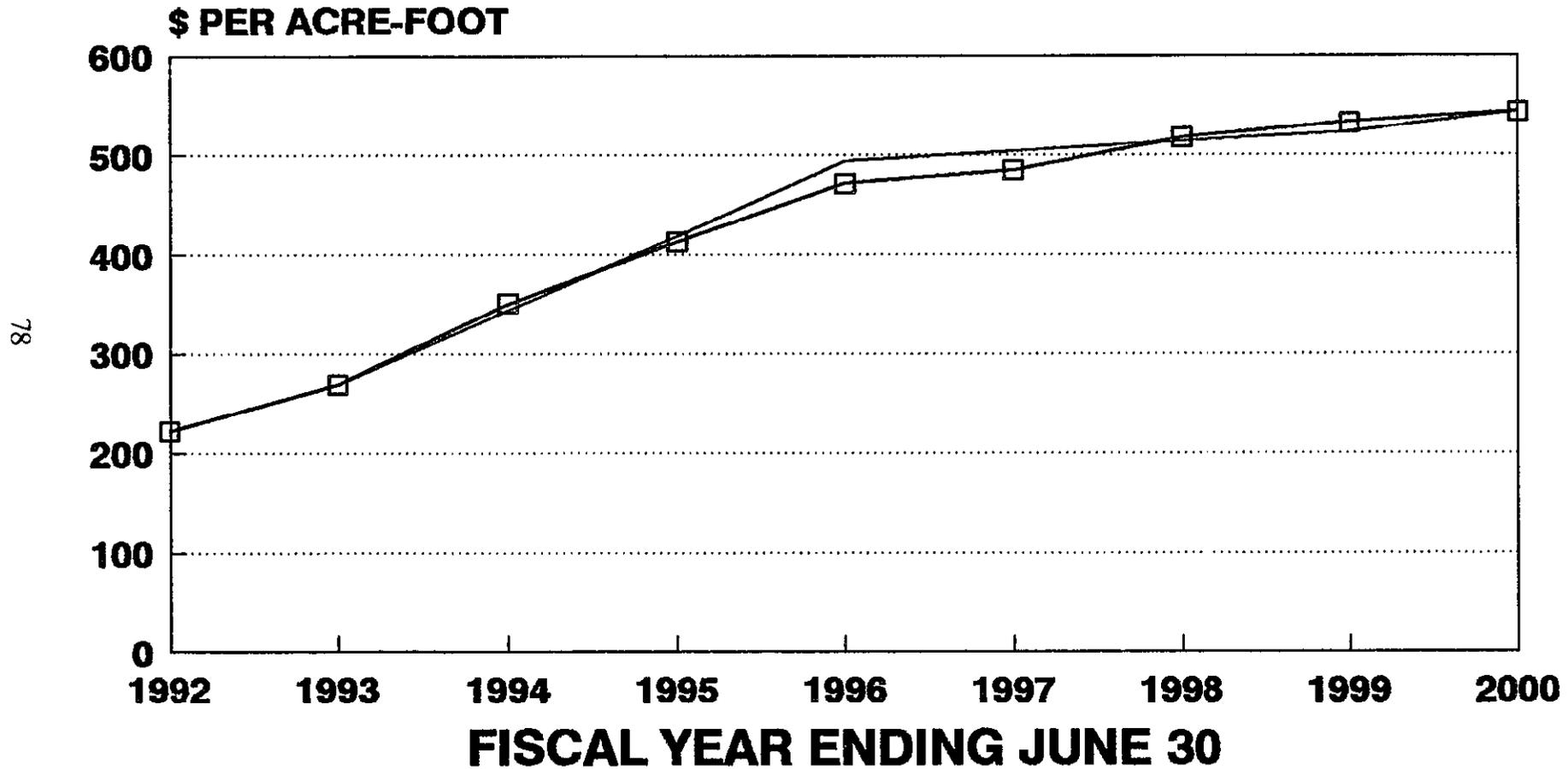
76

TABLE 14 (Continued)

CURRENT AND PROJECTED WATER RATES
WITH SEASONAL STORAGE
ALTERNATIVE A
[IN 000'S]

	FISCAL YEAR									
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
REVENUE REQUIREMENTS	\$1,482,208	\$1,517,841	\$1,622,637	\$1,727,799	\$1,832,175	\$1,938,693	\$2,058,296	\$2,214,074	\$2,363,566	\$2,541,279
REVENUE RECOVERY										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED	65,760	69,609	73,387	76,476	82,653	88,831	95,008	101,185	107,363	115,393
TREATED	170,076	179,512	188,755	196,219	210,349	224,479	238,609	252,739	266,869	284,998
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED	268,386	283,547	298,406	322,510	346,614	370,718	394,821	418,925	450,260	481,595
TREATED	692,128	729,292	765,641	820,775	875,909	931,044	986,178	1,041,313	1,112,051	1,182,790
SEASONAL										
UNTREATED	165,256	175,450	185,474	202,049	218,624	235,199	251,774	268,349	289,897	311,444
TREATED	106,798	113,032	119,149	128,609	138,070	147,530	156,991	166,451	178,589	190,727
TOTAL	\$1,468,404	\$1,550,442	\$1,630,812	\$1,746,638	\$1,872,219	\$1,997,801	\$2,123,381	\$2,248,962	\$2,405,029	\$2,566,947
ANNUAL BALANCE	(\$13,804)	\$32,601	\$8,175	\$18,839	\$40,044	\$59,108	\$65,085	\$34,888	\$41,463	\$25,668
SALES										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED	121	122	124	124	124	124	124	124	124	124
TREATED	261	264	267	267	267	267	267	267	267	267
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED	472	477	482	482	482	482	482	482	482	482
TREATED	1,018	1,030	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040
SEASONAL										
UNTREATED	405	410	414	414	414	414	414	414	414	414
TREATED	218	221	223	223	223	223	223	223	223	223
TOTAL	2,495	2,525	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550
RATES										
UNTREATED NON-INTER. WATER RATE	\$569	\$594	\$619	\$669	\$719	\$769	\$819	\$869	\$934	\$999
INCREASE OVER PRIOR YEAR	\$25	\$25	\$25	\$50	\$50	\$50	\$50	\$50	\$65	\$65
TREATMENT SURCHARGE	\$111	\$114	\$117	\$120	\$123	\$126	\$129	\$132	\$135	\$138
SEASONAL UNTREATED	\$408	\$428	\$448	\$488	\$528	\$568	\$608	\$648	\$700	\$752
SEASONAL TREATED	\$489	\$512	\$534	\$576	\$619	\$661	\$704	\$746	\$800	\$855
WORKING CAPITAL RESERVE FUND										
BEGINNING BALANCE	410,459	396,654	429,255	437,430	456,269	496,312	555,420	620,505	655,393	696,857
ANNUAL BALANCE	(13,804)	32,601	8,175	18,839	40,044	59,108	65,085	34,888	41,463	25,668
CUMULATIVE BALANCE	396,654	429,255	437,430	456,269	496,312	555,420	620,505	655,393	696,857	722,525
WORKING CAPITAL RESERVE FUND TARGET										
EMERGENCY RESERVE	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
SALES RESERVE	317,800	331,200	344,600	370,500	396,400	422,300	448,200	474,100	507,500	540,900
OPERATING RESERVE	60,362	67,771	76,069	85,363	95,772	107,429	120,486	135,110	151,489	169,833
TOTAL FUND TARGET	403,162	423,971	445,669	480,863	517,172	554,729	593,686	634,210	683,989	735,733

PROJECTED WATER RATES WITH SEASONAL STORAGE



— Smoothed —□— Calculated

FIGURE 7

both approaches. The smoothed approach enables a buildup of the working capital reserves to the recommended level by increasing rates slightly higher in 1996 and 1997. Beyond that time, Metropolitan could regularly include working capital reserves in its revenue requirements planning and rate setting. It must be recognized that the tables presented herein show uniform annual sales of 2,550,000 beyond 2002-03. It is highly probable that before the end of the study period, weather conditions will cause a decrease in sales due to either lack of demand or supply, and working capital reserves will need to be drawn upon. It is also possible that sales will exceed projections, and Water Rate Stabilization Funds will be accumulated.

Alternative Scenarios

Tables 15 through 17 present rate requirements for Alternative scenarios B, C and D from 1992 to 2010. Each has been developed using rate smoothing and funding of working capital reserves. Each alternative requires greater rate adjustments throughout the time period. Alternatives B and C can be accomplished with the proposed 1992-93 use of Rate Stabilization Funds. Alternative D would require additional use of Water Rate Stabilization Funds in fiscal year 1992-93. Figure 8 shows the indicated rate adjustments for each alternative. The figure indicates the additional \$75,000,000 in annual revenue generated from standby and connection charges will enable water rates to be about \$50 per acre foot lower than they would otherwise need to be.

RATES WITHOUT SEASONAL STORAGE

Tables 18 through 22 are similar to those presented above except they do not include a continuation of the seasonal storage program. The tables assume that the program is discontinued next fiscal year. It is further assumed that total sales would not be affected by a discontinuance of the program. Figure 9 compares the calculated and smoothed annual rate increases for the years 1992 through 2000 absent the seasonal storage program. Again, adoption of minimally higher rate increases in 1995 and 1996 will enable the working capital reserves to become fully funded.

Figure 10 presents the indicated rates under the four alternative scenarios. As with the seasonal storage program, the potential loss in revenues from the standby and connection charge programs would require an additional \$50 per acre-foot in water rates. Without a seasonal storage program, water rates would need to be about \$500 per acre-foot by the year 2000.

Figure 11 graphically demonstrates the cost of the seasonal storage program. Because the program enables as much as 25 percent of water sales to receive a significant discount, the impact on overall water rates is dramatic. The seasonal storage program causes basic noninterruptible water rates to be about \$50 per acre-foot greater each year in the study period. With discontinuance of the program, the smoothed water rate increases from 1993-94 through 1995-96 can be \$50 per acre-foot per year. With the seasonal storage program, the smoothed increases for those years would be \$75 per acre-foot for those same years. The seasonal storage

TABLE 15

CURRENT AND PROJECTED WATER RATES
WITH SEASONAL STORAGE
ALTERNATIVE B
[IN 000'S]

	FISCAL YEAR									
	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	
REVENUE REQUIREMENTS		\$489,188	\$690,258	\$908,515	\$1,100,523	\$1,162,540	\$1,260,815	\$1,331,557	\$1,387,856	
REVENUE RECOVERY										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED		21,662	26,822	37,065	47,930	57,140	58,846	60,601	62,947	
TREATED		54,957	69,283	96,253	121,993	144,619	150,949	156,723	162,795	
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED		102,421	135,784	177,777	221,898	225,147	231,850	241,018	257,226	
TREATED		264,558	352,616	452,479	561,617	577,530	599,599	623,323	663,274	
SEASONAL										
UNTREATED		54,851	77,453	105,293	134,751	136,900	141,154	147,094	157,884	
TREATED		35,738	50,637	67,130	85,310	87,988	91,554	95,400	102,035	
TOTAL		\$534,188	\$712,594	\$935,995	\$1,173,500	\$1,229,323	\$1,273,953	\$1,324,159	\$1,406,162	
ANNUAL BALANCE		\$45,000	\$22,336	\$27,480	\$72,977	\$66,783	\$13,138	(\$7,399)	\$18,306	
SALES										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED		98	100	106	112	112	114	117	119	
TREATED		211	215	229	241	242	247	252	257	
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED		381	389	414	436	438	447	456	464	
TREATED		822	840	894	941	945	964	983	1,002	
SEASONAL										
UNTREATED		327	334	356	375	377	384	392	399	
TREATED		176	180	192	202	203	207	211	215	
TOTAL		2,014	2,058	2,192	2,306	2,317	2,363	2,410	2,456	
RATES										
UNTREATED NON-INTER. WATER RATE	\$222	\$269	\$349	\$429	\$509	\$514	\$519	\$529	\$554	
INCREASE OVER PRIOR YEAR	\$25	\$47	\$80	\$80	\$80	\$5	\$5	\$10	\$25	
TREATMENT SURCHARGE	\$39	\$53	\$71	\$77	\$88	\$97	\$103	\$105	\$108	
SEASONAL UNTREATED	\$130	\$168	\$232	\$296	\$360	\$364	\$368	\$376	\$396	
SEASONAL TREATED	\$154	\$203	\$281	\$350	\$423	\$434	\$443	\$452	\$475	
WORKING CAPITAL RESERVE FUND										
BEGINNING BALANCE		175,000	220,000	242,336	269,816	342,793	409,576	422,714	415,315	
ANNUAL BALANCE		45,000	22,336	27,480	72,977	66,783	13,138	(7,399)	18,306	
CUMULATIVE BALANCE		220,000	242,336	269,816	342,793	409,576	422,714	415,315	433,621	
WORKING CAPITAL RESERVE FUND TARGET										
EMERGENCY RESERVE		25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	
SALES RESERVE		150,400	195,800	237,600	280,900	286,100	290,400	296,000	309,400	
OPERATING RESERVE		24,098	26,846	30,133	33,871	38,212	42,955	47,922	53,747	
TOTAL FUND TARGET		199,498	247,646	292,733	339,771	349,312	358,355	368,922	388,147	

TABLE 15 (Continued)

CURRENT AND PROJECTED WATER RATES
WITH SEASONAL STOPAGE
ALTERNATIVE B
[IN 000'S]

	FISCAL YEAR									
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
REVENUE REQUIREMENTS	\$1,507,208	\$1,542,841	\$1,647,637	\$1,752,799	\$1,857,175	\$1,963,693	\$2,083,296	\$2,239,074	\$2,368,566	\$2,566,279
REVENUE RECOVERY										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED	66,969	70,833	74,623	77,711	83,889	90,066	96,244	102,421	108,598	116,629
TREATED	172,684	182,152	191,421	198,885	213,015	227,145	241,275	255,405	269,535	287,664
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED	273,103	288,320	303,227	327,331	351,434	375,538	399,642	423,746	455,081	488,827
TREATED	702,306	739,593	776,043	831,178	886,312	941,447	996,581	1,051,715	1,122,454	1,198,394
SEASONAL										
UNTREATED	168,500	178,732	188,789	205,364	221,939	238,514	255,089	271,664	293,212	316,417
TREATED	108,545	114,799	120,934	130,394	139,855	149,315	158,776	168,236	180,374	193,405
TOTAL	\$1,492,107	\$1,574,429	\$1,655,036	\$1,770,864	\$1,896,445	\$2,022,026	\$2,147,607	\$2,273,188	\$2,429,255	\$2,601,835
ANNUAL BALANCE	(\$15,102)	\$31,588	\$7,400	\$18,064	\$39,270	\$58,333	\$64,312	\$34,114	\$40,689	\$35,056
SALES										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED	121	122	124	124	124	124	124	124	124	124
TREATED	261	264	267	267	267	267	267	267	267	267
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED	472	477	482	482	482	482	482	482	482	482
TREATED	1,018	1,030	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040
SEASONAL										
UNTREATED	405	410	414	414	414	414	414	414	414	414
TREATED	218	221	223	223	223	223	223	223	223	223
TOTAL	2,495	2,525	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550
RATES										
UNTREATED NON-INTER. WATER RATE	\$579	\$604	\$629	\$679	\$729	\$779	\$829	\$879	\$944	\$1,014
INCREASE OVER PRIOR YEAR	\$25	\$25	\$25	\$50	\$50	\$50	\$50	\$50	\$65	\$70
TREATMENT SURCHARGE	\$111	\$114	\$117	\$120	\$123	\$126	\$129	\$132	\$135	\$138
SEASONAL UNTREATED	\$416	\$436	\$456	\$496	\$536	\$576	\$616	\$656	\$708	\$764
SEASONAL TREATED	\$497	\$520	\$542	\$584	\$627	\$669	\$712	\$754	\$808	\$867
WORKING CAPITAL RESERVE FUND										
BEGINNING BALANCE	433,621	418,519	450,107	457,507	475,571	514,841	573,173	637,485	671,599	712,288
ANNUAL BALANCE	(15,102)	31,588	7,400	18,064	39,270	58,333	64,312	34,114	40,689	35,056
CUMULATIVE BALANCE	418,519	450,107	457,507	475,571	514,841	573,173	637,485	671,599	712,288	747,344
WORKING CAPITAL RESERVE FUND TARGET										
EMERGENCY RESERVE	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
SALES RESERVE	322,800	336,200	349,600	375,500	401,400	427,300	453,200	479,100	512,500	548,400
OPERATING RESERVE	60,362	67,771	76,069	85,363	95,772	107,429	120,486	135,110	151,489	169,833
TOTAL FUND TARGET	408,162	428,971	450,669	485,863	522,172	559,729	598,686	639,210	688,989	743,233

TABLE 16

CURRENT AND PROJECTED WATER RATES
WITH SEASONAL STORAGE
ALTERNATIVE C
[IN 000'S]

	FISCAL YEAR								
	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00
REVENUE REQUIREMENTS		\$489,188	\$740,258	\$933,515	\$1,125,523	\$1,187,540	\$1,285,815	\$1,356,557	\$1,412,856
REVENUE RECOVERY									
NON-INTERRUPTIBLE - JULY/AUGUST									
UNTREATED		21,662	26,822	39,189	49,606	58,262	59,991	61,768	64,137
TREATED		54,957	69,283	100,836	125,609	147,041	153,419	159,242	165,363
NON-INTERRUPTIBLE - BALANCE OF YEAR									
UNTREATED		102,421	143,565	183,993	226,258	229,527	236,318	245,574	259,548
TREATED		264,558	369,407	465,892	571,025	586,982	609,239	633,155	668,284
SEASONAL									
UNTREATED		54,851	82,804	109,567	137,749	139,912	144,226	150,227	159,480
TREATED		35,738	53,518	69,432	86,925	89,610	93,209	97,087	102,894
TOTAL		\$534,188	\$745,399	\$968,908	\$1,197,171	\$1,251,334	\$1,296,401	\$1,347,054	\$1,419,706
ANNUAL BALANCE		\$45,000	\$5,141	\$35,393	\$71,648	\$63,794	\$10,587	(\$9,504)	\$6,850
SALES									
NON-INTERRUPTIBLE - JULY/AUGUST									
UNTREATED		98	100	106	112	112	114	117	119
TREATED		211	215	229	241	242	247	252	257
NON-INTERRUPTIBLE - BALANCE OF YEAR									
UNTREATED		381	389	414	436	438	447	456	464
TREATED		822	840	894	941	945	964	983	1,002
SEASONAL									
UNTREATED		327	334	356	375	377	384	392	399
TREATED		176	180	192	202	203	207	211	215
TOTAL		2,014	2,058	2,192	2,306	2,317	2,363	2,410	2,456
RATES									
UNTREATED NON-INTER. WATER RATE	\$222	\$269	\$369	\$444	\$519	\$524	\$529	\$539	\$559
INCREASE OVER PRIOR YEAR	\$25	\$47	\$100	\$75	\$75	\$5	\$5	\$10	\$20
TREATMENT SURCHARGE	\$39	\$53	\$71	\$77	\$88	\$97	\$103	\$105	\$108
SEASONAL UNTREATED	\$130	\$168	\$248	\$308	\$368	\$372	\$376	\$384	\$400
SEASONAL TREATED	\$154	\$203	\$297	\$362	\$431	\$442	\$451	\$460	\$479
WORKING CAPITAL RESERVE FUND									
BEGINNING BALANCE		175,000	220,000	225,141	260,533	332,182	395,976	406,563	397,059
ANNUAL BALANCE		45,000	5,141	35,393	71,648	63,794	10,587	(9,504)	6,850
CUMULATIVE BALANCE		220,000	225,141	260,533	332,182	395,976	406,563	397,059	403,909
WORKING CAPITAL RESERVE FUND TARGET									
EMERGENCY RESERVE		25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
SALES RESERVE		150,400	205,800	245,100	285,900	291,100	295,400	301,000	311,900
OPERATING RESERVE		24,098	26,846	30,133	33,871	38,212	42,955	47,922	53,747
TOTAL FUND TARGET		199,498	257,646	300,233	344,771	354,312	363,355	373,922	390,647

TABLE 16 (Continued)

CURRENT AND PROJECTED WATER RATES
WITH SEASONAL STORAGE
ALTERNATIVE C
[IN 000'S]

	FISCAL YEAR									
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
REVENUE REQUIREMENTS	\$1,532,208	\$1,567,841	\$1,672,637	\$1,777,799	\$1,882,175	\$1,988,693	\$2,108,296	\$2,264,074	\$2,413,566	\$2,591,279
REVENUE RECOVERY										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED	67,573	72,668	77,711	82,036	86,360	90,684	95,008	101,185	109,834	118,482
TREATED	173,988	186,112	198,086	208,217	218,347	228,478	238,609	252,739	272,201	291,663
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED	280,178	300,254	320,099	336,972	353,845	370,718	394,821	428,567	462,312	496,058
TREATED	717,574	765,345	812,453	851,983	891,514	931,044	986,178	1,062,118	1,138,058	1,213,998
SEASONAL										
UNTREATED	173,365	186,938	200,392	211,994	223,597	235,199	251,774	274,979	298,184	321,389
TREATED	111,165	119,218	127,181	133,964	140,747	147,530	156,991	170,021	183,052	196,082
TOTAL	\$1,523,843	\$1,630,535	\$1,735,922	\$1,825,166	\$1,914,410	\$2,003,653	\$2,123,382	\$2,289,610	\$2,463,641	\$2,637,672
ANNUAL BALANCE	(\$8,365)	\$62,693	\$63,286	\$47,367	\$32,234	\$14,960	\$15,087	\$25,536	\$50,076	\$46,394
SALES										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED	121	122	124	124	124	124	124	124	124	124
TREATED	261	264	267	267	267	267	267	267	267	267
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED	472	477	482	482	482	482	482	482	482	482
TREATED	1,018	1,030	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040
SEASONAL										
UNTREATED	405	410	414	414	414	414	414	414	414	414
TREATED	218	221	223	223	223	223	223	223	223	223
TOTAL	2,495	2,525	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550
RATES										
UNTREATED NON-INTER. WATER RATE	\$594	\$629	\$664	\$699	\$734	\$769	\$819	\$889	\$959	\$1,029
INCREASE OVER PRIOR YEAR	\$35	\$35	\$35	\$35	\$35	\$35	\$50	\$70	\$70	\$70
TREATMENT SURCHARGE	\$111	\$114	\$117	\$120	\$123	\$126	\$129	\$132	\$135	\$138
SEASONAL UNTREATED	\$428	\$456	\$484	\$512	\$540	\$568	\$608	\$664	\$720	\$776
SEASONAL TREATED	\$509	\$540	\$570	\$600	\$631	\$661	\$704	\$762	\$820	\$879
WORKING CAPITAL RESERVE FUND										
BEGINNING BALANCE	403,909	395,544	458,238	521,523	568,890	601,124	616,084	631,170	656,706	706,782
ANNUAL BALANCE	(8,365)	62,693	63,286	47,367	32,234	14,960	15,087	25,536	50,076	46,394
CUMULATIVE BALANCE	395,544	458,238	521,523	568,890	601,124	616,084	631,170	656,706	706,782	753,176
WORKING CAPITAL RESERVE FUND TARGET										
EMERGENCY RESERVE	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
SALES RESERVE	330,300	348,700	367,100	385,500	403,900	422,300	448,200	484,100	520,000	555,900
OPERATING RESERVE	60,362	67,771	76,069	85,363	95,772	107,429	120,486	135,110	151,489	169,833
TOTAL FUND TARGET	415,662	441,471	468,169	495,863	524,672	554,729	593,686	644,210	696,489	750,733

TABLE 17

CURRENT AND PROJECTED WATER RATES
WITH SEASONAL STORAGE
ALTERNATIVE D
[IN 000'S]

	FISCAL YEAR								
	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00
REVENUE REQUIREMENTS		\$489,188	\$790,258	\$958,515	\$1,150,523	\$1,212,540	\$1,310,815	\$1,381,557	\$1,437,856
REVENUE RECOVERY									
NON-INTERRUPTIBLE - JULY/AUGUST									
UNTREATED		21,662	26,822	42,162	51,617	59,160	60,907	63,286	66,874
TREATED		54,957	69,263	107,253	129,949	148,979	155,395	162,518	171,269
NON-INTERRUPTIBLE - BALANCE OF YEAR									
UNTREATED		102,421	154,459	191,452	229,745	233,031	242,125	256,053	270,227
TREATED		264,558	392,915	481,988	578,551	594,543	621,771	655,767	691,328
SEASONAL									
UNTREATED		54,851	90,295	114,696	140,147	142,322	148,219	157,433	166,824
TREATED		35,738	57,552	72,194	88,216	90,907	95,359	100,967	106,848
TOTAL		\$534,188	\$791,325	\$1,009,745	\$1,218,225	\$1,268,943	\$1,323,777	\$1,396,025	\$1,473,370
ANNUAL BALANCE		\$45,000	\$1,067	\$51,230	\$67,702	\$56,404	\$12,962	\$14,467	\$35,514
SALES									
NON-INTERRUPTIBLE - JULY/AUGUST									
UNTREATED		98	100	106	112	112	114	117	119
TREATED		211	215	229	241	242	247	252	257
NON-INTERRUPTIBLE - BALANCE OF YEAR									
UNTREATED		381	389	414	436	438	447	456	464
TREATED		822	840	894	941	945	964	983	1,002
SEASONAL									
UNTREATED		327	334	356	375	377	384	392	399
TREATED		176	180	192	202	203	207	211	215
TOTAL		2,014	2,058	2,192	2,306	2,317	2,363	2,410	2,456
RATES									
UNTREATED NON-INTER. WATER RATE		\$222	\$269	\$397	\$462	\$527	\$532	\$542	\$582
INCREASE OVER PRIOR YEAR		\$25	\$47	\$128	\$65	\$65	\$5	\$10	\$20
TREATMENT SURCHARGE		\$39	\$53	\$71	\$77	\$88	\$97	\$103	\$108
SEASONAL UNTREATED		\$130	\$168	\$270	\$322	\$374	\$378	\$386	\$418
SEASONAL TREATED		\$154	\$203	\$320	\$376	\$437	\$448	\$461	\$497
WORKING CAPITAL RESERVE FUND									
BEGINNING BALANCE		175,000	220,000	221,067	272,297	339,999	396,402	409,364	423,832
ANNUAL BALANCE		45,000	1,067	51,230	67,702	56,404	12,962	14,467	35,514
CUMULATIVE BALANCE		220,000	221,067	272,297	339,999	396,402	409,364	423,832	459,346
WORKING CAPITAL RESERVE FUND TARGET									
EMERGENCY RESERVE		25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
SALES RESERVE		150,400	219,800	254,100	289,900	295,100	301,900	312,500	323,400
OPERATING RESERVE		24,098	26,846	30,133	33,871	38,212	42,955	47,922	53,747
TOTAL FUND TARGET		199,498	271,646	309,233	348,771	358,312	369,855	385,422	402,147

TABLE 17 (Continued)

CURRENT AND PROJECTED WATER RATES
WITH SEASONAL STORAGE
ALTERNATIVE D
[IN 000'S]

	FISCAL YEAR									
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
REVENUE REQUIREMENTS	\$1,557,208	\$1,592,841	\$1,697,637	\$1,802,799	\$1,907,175	\$2,013,693	\$2,133,296	\$2,289,074	\$2,438,566	\$2,616,279
REVENUE RECOVERY										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED	70,354	73,646	76,847	81,171	85,495	91,672	97,850	104,027	112,058	120,088
TREATED	179,988	188,224	196,219	206,350	216,481	230,611	244,741	258,871	277,000	295,129
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED	283,951	296,912	316,725	333,598	357,702	381,805	405,909	437,244	468,579	499,914
TREATED	725,717	758,134	805,171	844,701	899,836	954,970	1,010,105	1,080,843	1,151,582	1,222,320
SEASONAL										
UNTREATED	175,960	184,641	198,071	209,674	226,249	242,824	259,399	280,946	302,494	324,041
TREATED	112,562	117,981	125,932	132,715	142,175	151,636	161,096	173,234	185,372	197,510
TOTAL	\$1,548,531	\$1,619,538	\$1,718,965	\$1,808,208	\$1,927,937	\$2,053,518	\$2,179,100	\$2,335,166	\$2,497,085	\$2,659,003
ANNUAL BALANCE	(\$8,677)	\$26,697	\$21,328	\$5,409	\$20,762	\$39,825	\$45,804	\$46,092	\$58,519	\$42,724
SALES										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED	121	122	124	124	124	124	124	124	124	124
TREATED	261	264	267	267	267	267	267	267	267	267
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED	472	477	482	482	482	482	482	482	482	482
TREATED	1,018	1,030	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040
SEASONAL										
UNTREATED	405	410	414	414	414	414	414	414	414	414
TREATED	218	221	223	223	223	223	223	223	223	223
TOTAL	2,495	2,525	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550
RATES										
UNTREATED NON-INTER. WATER RATE	\$602	\$622	\$657	\$692	\$742	\$792	\$842	\$907	\$972	\$1,037
INCREASE OVER PRIOR YEAR	\$20	\$20	\$35	\$35	\$50	\$50	\$50	\$65	\$65	\$65
TREATMENT SURCHARGE	\$111	\$114	\$117	\$120	\$123	\$126	\$129	\$132	\$135	\$138
SEASONAL UNTREATED	\$434	\$450	\$478	\$506	\$546	\$586	\$626	\$678	\$730	\$782
SEASONAL TREATED	\$516	\$534	\$564	\$595	\$637	\$680	\$722	\$776	\$831	\$885
WORKING CAPITAL RESERVE FUND										
BEGINNING BALANCE	459,346	450,669	477,366	498,694	504,103	524,865	564,690	610,494	656,586	715,105
ANNUAL BALANCE	(8,677)	26,697	21,328	5,409	20,762	39,825	45,804	46,092	58,519	42,724
CUMULATIVE BALANCE	450,669	477,366	498,694	504,103	524,865	564,690	610,494	656,586	715,105	757,829
WORKING CAPITAL RESERVE FUND TARGET										
EMERGENCY RESERVE	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
SALES RESERVE	334,300	345,200	363,600	382,000	407,900	433,800	459,700	493,100	526,500	559,900
OPERATING RESERVE	60,362	67,771	76,069	85,363	95,772	107,429	120,486	135,110	151,489	169,833
TOTAL FUND TARGET	419,662	437,971	464,669	492,363	528,672	566,229	605,186	653,210	702,989	754,733

ALTERNATIVE WATER RATES WITH SEASONAL STORAGE

98

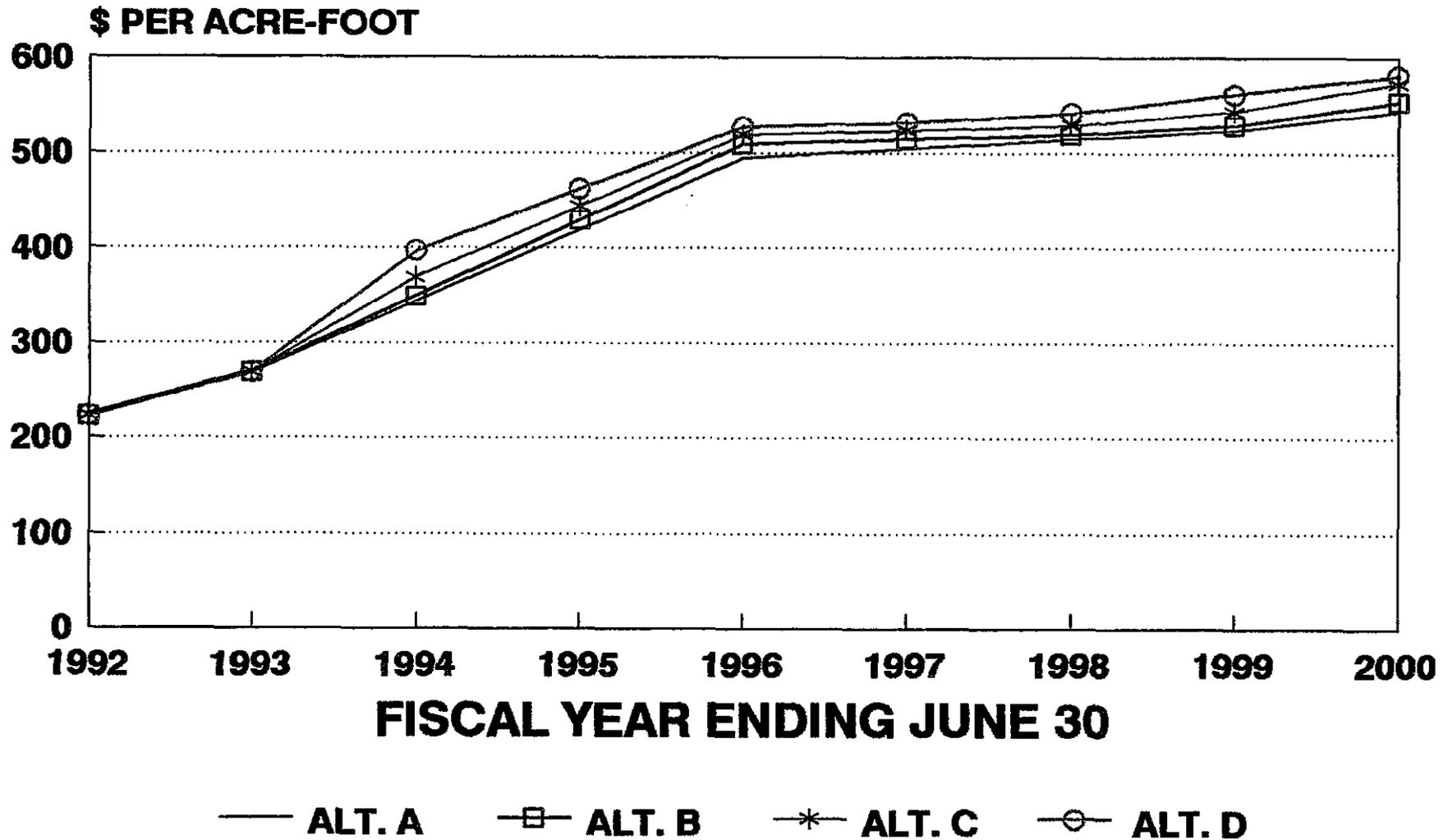


FIGURE 8

TABLE 18

CURRENT AND PROJECTED WATER RATES
WITHOUT SEASONAL STORAGE
ALTERNATIVE A
[IN 000'S]

	FISCAL YEAR									
	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	
REVENUE REQUIREMENTS		\$489,188	\$690,258	\$883,515	\$1,075,523	\$1,137,540	\$1,235,815	\$1,306,557	\$1,362,856	
REVENUE RECOVERY										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED		36,484	45,174	56,689	71,946	82,608	86,118	94,224	98,698	
TREATED		64,340	81,112	104,082	129,653	148,869	157,233	171,719	179,612	
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED		172,498	207,675	266,853	320,802	329,489	360,488	377,903	393,146	
TREATED		309,727	381,298	480,891	578,122	601,574	656,975	687,711	716,401	
SEASONAL										
UNTREATED		0	0	0	0	0	0	0	0	
TREATED		0	0	0	0	0	0	0	0	
TOTAL		\$583,050	\$715,258	\$908,515	\$1,100,523	\$1,162,540	\$1,260,815	\$1,331,557	\$1,387,856	
ANNUAL BALANCE		\$93,862	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	
SALES										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED		164	168	179	188	189	193	197	200	
TREATED		247	252	268	282	284	289	295	301	
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED		641	655	698	734	738	752	767	782	
TREATED		962	983	1,047	1,101	1,107	1,129	1,151	1,173	
SEASONAL										
UNTREATED		0	0	0	0	0	0	0	0	
TREATED		0	0	0	0	0	0	0	0	
TOTAL		2,014	2,058	2,192	2,306	2,317	2,363	2,410	2,456	
RATES										
UNTREATED NON-INTER. WATER RATE		\$222	\$269	\$317	\$382	\$437	\$447	\$479	\$503	
INCREASE OVER PRIOR YEAR		\$25	\$47	\$48	\$65	\$55	\$10	\$33	\$10	
TREATMENT SURCHARGE		\$39	\$53	\$71	\$77	\$88	\$97	\$103	\$108	
SEASONAL UNTREATED		\$130	\$168	\$206	\$258	\$302	\$310	\$336	\$355	
SEASONAL TREATED		\$154	\$203	\$256	\$313	\$365	\$380	\$411	\$434	
WORKING CAPITAL RESERVE FUND										
BEGINNING BALANCE		175,000	268,862	293,862	318,862	343,862	368,862	393,862	418,862	
ANNUAL BALANCE		93,862	25,000	25,000	25,000	25,000	25,000	25,000	25,000	
CUMULATIVE BALANCE		268,862	293,862	318,862	343,862	368,862	393,862	418,862	443,862	

TABLE 18 (Continued)

CURRENT AND PROJECTED WATER RATES
WITHOUT SEASONAL STORAGE
ALTERNATIVE A
[IN 000'S]

	FISCAL YEAR									
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
REVENUE REQUIREMENTS	\$1,482,208	\$1,517,841	\$1,622,637	\$1,727,799	\$1,832,175	\$1,938,693	\$2,058,296	\$2,214,074	\$2,363,566	\$2,541,279
REVENUE RECOVERY										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED	102,356	112,674	112,780	121,745	129,758	137,933	146,287	155,936	168,962	180,478
TREATED	186,516	203,317	204,752	219,136	232,091	245,291	258,758	274,168	294,643	312,853
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED	434,427	435,749	475,045	506,309	538,211	570,806	608,458	659,284	704,219	761,952
TREATED	783,910	791,101	855,060	905,609	957,116	1,009,662	1,069,793	1,149,686	1,220,742	1,310,995
SEASONAL										
UNTREATED	0	0	0	0	0	0	0	0	0	0
TREATED	0	0	0	0	0	0	0	0	0	0
TOTAL	\$1,507,208	\$1,542,841	\$1,647,637	\$1,752,799	\$1,857,175	\$1,963,693	\$2,083,296	\$2,239,074	\$2,388,566	\$2,566,279
ANNUAL BALANCE	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
SALES										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED	204	206	208	208	208	208	208	208	208	208
TREATED	305	309	312	312	312	312	312	312	312	312
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED	794	804	812	812	812	812	812	812	812	812
TREATED	1,192	1,206	1,218	1,218	1,218	1,218	1,218	1,218	1,218	1,218
SEASONAL										
UNTREATED	0	0	0	0	0	0	0	0	0	0
TREATED	0	0	0	0	0	0	0	0	0	0
TOTAL	2,495	2,525	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550
RATES										
UNTREATED NON-INTER. WATER RATE	\$547	\$542	\$585	\$624	\$663	\$703	\$749	\$812	\$867	\$938
INCREASE OVER PRIOR YEAR	\$44	(\$5)	\$43	\$39	\$39	\$40	\$46	\$63	\$55	\$71
TREATMENT SURCHARGE	\$111	\$114	\$117	\$120	\$123	\$126	\$129	\$132	\$135	\$138
SEASONAL UNTREATED	\$390	\$386	\$420	\$451	\$483	\$515	\$552	\$602	\$646	\$703
SEASONAL TREATED	\$471	\$470	\$507	\$540	\$574	\$608	\$648	\$700	\$747	\$806
WORKING CAPITAL RESERVE FUND										
BEGINNING BALANCE	443,862	468,862	493,862	518,862	543,862	568,862	593,862	618,862	643,862	668,862
ANNUAL BALANCE	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
CUMULATIVE BALANCE	468,862	493,862	518,862	543,862	568,862	593,862	618,862	643,862	668,862	693,862

TABLE 19

CURRENT AND PROJECTED WATER RATES
WITHOUT SEASONAL STORAGE
ALTERNATIVE A
[IN 000'S]

	FISCAL YEAR								
	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00
REVENUE REQUIREMENTS		\$489,188	\$690,258	\$883,515	\$1,075,523	\$1,137,540	\$1,235,815	\$1,306,557	\$1,362,856
REVENUE RECOVERY									
NON-INTERRUPTIBLE - JULY/AUGUST									
UNTREATED		36,484	45,174	57,059	69,435	79,219	85,612	92,232	96,998
TREATED		64,340	81,112	104,637	125,885	143,786	156,474	168,731	177,062
NON-INTERRUPTIBLE - BALANCE OF YEAR									
UNTREATED		172,498	209,030	257,537	307,643	327,553	352,866	371,394	390,213
TREATED		309,727	383,331	466,917	558,382	598,670	645,541	677,948	712,002
SEASONAL									
UNTREATED		0	0	0	0	0	0	0	0
TREATED		0	0	0	0	0	0	0	0
TOTAL		\$583,050	\$718,647	\$886,150	\$1,061,345	\$1,149,228	\$1,240,494	\$1,310,305	\$1,376,276
ANNUAL BALANCE		\$93,862	\$28,389	\$2,635	(\$14,178)	\$11,688	\$4,679	\$3,748	\$13,420
SALES									
NON-INTERRUPTIBLE - JULY/AUGUST									
UNTREATED		164	168	179	188	189	193	197	200
TREATED		247	252	268	282	284	289	295	301
NON-INTERRUPTIBLE - BALANCE OF YEAR									
UNTREATED		641	655	698	734	738	752	767	782
TREATED		962	983	1,047	1,101	1,107	1,129	1,151	1,173
SEASONAL									
UNTREATED		0	0	0	0	0	0	0	0
TREATED		0	0	0	0	0	0	0	0
TOTAL		2,014	2,058	2,192	2,306	2,317	2,363	2,410	2,456
RATES									
UNTREATED NON-INTER. WATER RATE	\$222	\$269	\$319	\$369	\$419	\$444	\$469	\$484	\$499
INCREASE OVER PRIOR YEAR	\$25	\$47	\$50	\$50	\$50	\$25	\$25	\$15	\$15
TREATMENT SURCHARGE	\$39	\$53	\$71	\$77	\$88	\$97	\$103	\$105	\$108
SEASONAL UNTREATED	\$130	\$168	\$208	\$248	\$288	\$308	\$328	\$340	\$352
SEASONAL TREATED	\$154	\$203	\$257	\$302	\$351	\$378	\$403	\$416	\$431
WORKING CAPITAL RESERVE FUND									
BEGINNING BALANCE		175,000	268,862	297,251	299,886	285,707	297,396	302,075	305,823
ANNUAL BALANCE		93,862	28,389	2,635	(14,178)	11,688	4,679	3,748	13,420
CUMULATIVE BALANCE		268,862	297,251	299,886	285,707	297,396	302,075	305,823	319,242
WORKING CAPITAL RESERVE FUND TARGET									
EMERGENCY RESERVE		25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
SALES RESERVE		150,400	180,800	207,600	235,900	251,100	265,400	273,500	281,900
OPERATING RESERVE		24,098	26,846	30,133	33,871	38,212	42,955	47,922	53,747
TOTAL FUND TARGET		199,498	232,646	262,733	294,771	314,312	333,355	346,422	360,647

TABLE 19 (Continued)

CURRENT AND PROJECTED WATER RATES
WITHOUT SEASONAL STORAGE
ALTERNATIVE A
[IN 000'S]

	FISCAL YEAR									
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
REVENUE REQUIREMENTS	\$1,482,208	\$1,517,841	\$1,622,637	\$1,727,799	\$1,832,175	\$1,938,693	\$2,058,296	\$2,214,074	\$2,363,566	\$2,541,279
REVENUE RECOVERY										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED	101,592	108,995	116,317	124,640	132,963	141,286	149,610	157,933	168,337	179,781
TREATED	185,371	197,798	210,057	223,478	236,899	250,320	263,741	277,163	293,705	311,808
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED	420,242	449,414	486,340	518,817	551,294	583,770	616,247	656,843	701,499	746,154
TREATED	762,632	811,598	872,002	924,371	976,740	1,029,109	1,081,477	1,146,025	1,216,662	1,287,299
SEASONAL										
UNTREATED	0	0	0	0	0	0	0	0	0	0
TREATED	0	0	0	0	0	0	0	0	0	0
TOTAL	\$1,469,836	\$1,567,805	\$1,684,716	\$1,791,306	\$1,897,896	\$2,004,486	\$2,111,076	\$2,237,964	\$2,380,203	\$2,525,043
ANNUAL BALANCE	(\$12,372)	\$49,963	\$62,079	\$63,506	\$65,720	\$65,792	\$52,780	\$23,890	\$16,637	\$16,236
SALES										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED	204	206	208	208	208	208	208	208	208	208
TREATED	305	309	312	312	312	312	312	312	312	312
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED	794	804	812	812	812	812	812	812	812	812
TREATED	1,192	1,206	1,218	1,218	1,218	1,218	1,218	1,218	1,218	1,218
SEASONAL										
UNTREATED	0	0	0	0	0	0	0	0	0	0
TREATED	0	0	0	0	0	0	0	0	0	0
TOTAL	2,495	2,525	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550
RATES										
UNTREATED NON-INTER. WATER RATE	\$529	\$559	\$599	\$639	\$679	\$719	\$759	\$809	\$864	\$919
INCREASE OVER PRIOR YEAR	\$30	\$30	\$40	\$40	\$40	\$40	\$40	\$50	\$55	\$55
TREATMENT SURCHARGE	\$111	\$114	\$117	\$120	\$123	\$126	\$129	\$132	\$135	\$138
SEASONAL UNTREATED	\$376	\$400	\$432	\$464	\$496	\$528	\$560	\$600	\$644	\$688
SEASONAL TREATED	\$457	\$484	\$518	\$552	\$587	\$621	\$656	\$698	\$744	\$791
WORKING CAPITAL RESERVE FUND										
BEGINNING BALANCE	319,242	306,870	356,834	418,913	482,419	548,139	613,932	666,712	690,601	707,238
ANNUAL BALANCE	(12,372)	49,963	62,079	63,506	65,720	65,792	52,780	23,890	16,637	(16,236)
CUMULATIVE BALANCE	306,870	356,834	418,913	482,419	548,139	613,932	666,712	690,601	707,238	691,002
WORKING CAPITAL RESERVE FUND TARGET										
EMERGENCY RESERVE	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
SALES RESERVE	297,800	313,700	334,600	355,500	376,400	397,300	418,200	444,100	472,500	500,900
OPERATING RESERVE	60,362	67,771	76,069	85,363	95,772	107,429	120,486	135,110	151,489	169,833
TOTAL FUND TARGET	383,162	406,471	435,669	465,863	497,172	529,729	563,686	604,210	648,989	695,733

TABLE 20

CURRENT AND PROJECTED WATER RATES
WITHOUT SEASONAL STORAGE
ALTERNATIVE B
[IN 000'S]

	FISCAL YEAR								
	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00
REVENUE REQUIREMENTS		\$489,188	\$690,258	\$908,515	\$1,100,523	\$1,162,540	\$1,260,815	\$1,331,557	\$1,387,856
REVENUE RECOVERY									
NON-INTERRUPTIBLE - JULY/AUGUST									
UNTREATED		36,484	45,174	57,953	71,316	82,055	88,505	95,182	99,002
TREATED		64,340	81,112	105,979	128,708	148,040	160,813	173,156	180,068
NON-INTERRUPTIBLE - BALANCE OF YEAR									
UNTREATED		172,498	212,307	264,517	318,656	338,619	364,152	379,068	394,123
TREATED		309,727	388,246	477,386	574,902	615,269	662,470	689,459	717,867
SEASONAL									
UNTREATED		0	0	0	0	0	0	0	0
TREATED		0	0	0	0	0	0	0	0
TOTAL		\$583,050	\$726,838	\$905,834	\$1,093,583	\$1,183,983	\$1,275,939	\$1,336,864	\$1,391,061
ANNUAL BALANCE		\$93,862	\$36,580	(\$2,681)	(\$6,940)	\$21,443	\$15,124	\$5,306	\$3,205
SALES									
NON-INTERRUPTIBLE - JULY/AUGUST									
UNTREATED		164	168	179	188	189	193	197	200
TREATED		247	252	268	282	284	289	295	301
NON-INTERRUPTIBLE - BALANCE OF YEAR									
UNTREATED		641	655	698	734	738	752	767	782
TREATED		962	983	1,047	1,101	1,107	1,129	1,151	1,173
SEASONAL									
UNTREATED		0	0	0	0	0	0	0	0
TREATED		0	0	0	0	0	0	0	0
TOTAL		2,014	2,058	2,192	2,306	2,317	2,363	2,410	2,456
RATES									
UNTREATED NON-INTER. WATER RATE	\$222	\$269	\$324	\$379	\$434	\$459	\$484	\$494	\$504
INCREASE OVER PRIOR YEAR	\$25	\$47	\$55	\$55	\$55	\$25	\$25	\$10	\$10
TREATMENT SURCHARGE	\$39	\$53	\$71	\$77	\$88	\$97	\$103	\$105	\$108
SEASONAL UNTREATED	\$130	\$168	\$212	\$256	\$300	\$320	\$340	\$348	\$356
SEASONAL TREATED	\$154	\$203	\$261	\$310	\$363	\$390	\$415	\$424	\$435
WORKING CAPITAL RESERVE FUND									
BEGINNING BALANCE		175,000	268,862	305,442	302,761	295,820	317,264	332,388	337,694
ANNUAL BALANCE		93,862	36,580	(2,681)	(6,940)	21,443	15,124	5,306	3,205
CUMULATIVE BALANCE		268,862	305,442	302,761	295,820	317,264	332,388	337,694	340,899
WORKING CAPITAL RESERVE FUND TARGET									
EMERGENCY RESERVE		25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
SALES RESERVE		150,400	183,300	212,600	243,400	258,600	272,900	278,500	284,400
OPERATING RESERVE		24,098	26,846	30,133	33,871	38,212	42,955	47,922	53,747
TOTAL FUND TARGET		199,498	235,146	267,733	302,271	321,812	340,855	351,422	363,147

TABLE 20 (Continued)

CURRENT AND PROJECTED WATER RATES
WITHOUT SEASONAL STORAGE
ALTERNATIVE B
[IN 000'S]

	FISCAL YEAR									
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
REVENUE REQUIREMENTS	\$1,507,208	\$1,542,841	\$1,647,637	\$1,752,799	\$1,857,175	\$1,963,693	\$2,083,296	\$2,239,074	\$2,388,566	\$2,566,279
REVENUE RECOVERY										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED	102,610	111,056	119,438	126,721	134,004	141,286	148,569	158,973	169,377	183,943
TREATED	186,897	200,889	214,739	226,599	238,460	250,320	262,181	278,723	295,266	318,050
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED	428,186	461,473	494,459	522,876	551,294	579,711	620,307	660,903	717,737	778,631
TREATED	774,548	829,687	884,181	930,460	976,740	1,023,019	1,087,567	1,152,114	1,241,020	1,336,014
SEASONAL										
UNTREATED	0	0	0	0	0	0	0	0	0	0
TREATED	0	0	0	0	0	0	0	0	0	0
TOTAL	\$1,492,242	\$1,603,104	\$1,712,817	\$1,806,657	\$1,900,497	\$1,994,337	\$2,118,624	\$2,250,714	\$2,423,400	\$2,616,639
ANNUAL BALANCE	(\$14,967)	\$60,263	\$65,180	\$53,857	\$43,321	\$30,643	\$35,328	\$11,640	\$34,834	\$50,360
SALES										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED	204	206	208	208	208	208	208	208	208	208
TREATED	305	309	312	312	312	312	312	312	312	312
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED	794	804	812	812	812	812	812	812	812	812
TREATED	1,192	1,206	1,218	1,218	1,218	1,218	1,218	1,218	1,218	1,218
SEASONAL										
UNTREATED	0	0	0	0	0	0	0	0	0	0
TREATED	0	0	0	0	0	0	0	0	0	0
TOTAL	2,495	2,525	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550
RATES										
UNTREATED NON-INTER. WATER RATE	\$539	\$574	\$609	\$644	\$679	\$714	\$764	\$814	\$884	\$959
INCREASE OVER PRIOR YEAR	\$35	\$35	\$35	\$35	\$35	\$35	\$50	\$50	\$70	\$75
TREATMENT SURCHARGE	\$111	\$114	\$117	\$120	\$123	\$126	\$129	\$132	\$135	\$138
SEASONAL UNTREATED	\$384	\$412	\$440	\$468	\$496	\$524	\$564	\$604	\$660	\$720
SEASONAL TREATED	\$465	\$496	\$526	\$556	\$587	\$617	\$660	\$702	\$760	\$823
WORKING CAPITAL RESERVE FUND										
BEGINNING BALANCE	340,899	325,932	386,195	451,375	505,232	548,553	579,196	614,525	626,164	660,998
ANNUAL BALANCE	(14,967)	60,263	65,180	53,857	43,321	30,643	35,328	11,640	34,834	50,360
CUMULATIVE BALANCE	325,932	386,195	451,375	505,232	548,553	579,196	614,525	626,164	660,998	711,358
WORKING CAPITAL RESERVE FUND TARGET										
EMERGENCY RESERVE	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
SALES RESERVE	302,800	321,200	339,600	358,000	376,400	394,800	420,700	446,600	482,500	520,900
OPERATING RESERVE	60,362	67,771	76,069	85,363	95,772	107,429	120,486	135,110	151,489	169,833
TOTAL FUND TARGET	388,162	413,971	440,669	488,363	497,172	527,229	566,186	606,710	658,989	715,733

TABLE 21

CURRENT AND PROJECTED WATER RATES
WITHOUT SEASONAL STORAGE
ALTERNATIVE C
[IN 000'S]

	FISCAL YEAR								
	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00
REVENUE REQUIREMENTS		\$489,143	\$740,258	\$933,515	\$1,125,523	\$1,187,540	\$1,285,815	\$1,356,557	\$1,412,856
REVENUE RECOVERY									
NON-INTERRUPTIBLE - JULY/AUGUST									
UNTREATED		36,484	45,174	59,742	75,080	87,727	91,397	95,182	100,004
TREATED		64,340	81,112	108,662	134,353	156,548	165,151	173,156	181,571
NON-INTERRUPTIBLE - BALANCE OF YEAR									
UNTREATED		172,498	218,859	278,475	340,683	349,685	364,152	382,905	401,943
TREATED		309,727	398,075	498,324	607,943	631,868	662,470	695,214	729,597
SEASONAL									
UNTREATED		0	0	0	0	0	0	0	0
TREATED		0	0	0	0	0	0	0	0
TOTAL		\$583,050	\$743,220	\$945,203	\$1,158,058	\$1,225,828	\$1,283,169	\$1,346,455	\$1,413,116
ANNUAL BALANCE		\$93,907	\$2,962	\$11,687	\$32,536	\$38,288	(\$2,645)	(\$10,102)	\$260
SALES									
NON-INTERRUPTIBLE - JULY/AUGUST									
UNTREATED		164	168	179	188	189	193	197	200
TREATED		247	252	268	282	284	289	295	301
NON-INTERRUPTIBLE - BALANCE OF YEAR									
UNTREATED		641	655	698	734	738	752	767	782
TREATED		962	983	1,047	1,101	1,107	1,129	1,151	1,173
SEASONAL									
UNTREATED		0	0	0	0	0	0	0	0
TREATED		0	0	0	0	0	0	0	0
TOTAL		2,014	2,058	2,192	2,306	2,317	2,363	2,410	2,456
RATES									
UNTREATED NON-INTER. WATER RATE	\$222	\$269	\$334	\$399	\$464	\$474	\$484	\$499	\$514
INCREASE OVER PRIOR YEAR	\$25	\$47	\$65	\$65	\$65	\$10	\$10	\$15	\$15
TREATMENT SURCHARGE	\$39	\$53	\$71	\$77	\$88	\$97	\$103	\$105	\$108
SEASONAL UNTREATED	\$130	\$168	\$220	\$272	\$324	\$332	\$340	\$352	\$364
SEASONAL TREATED	\$154	\$203	\$269	\$326	\$387	\$402	\$415	\$428	\$443
WORKING CAPITAL RESERVE FUND									
BEGINNING BALANCE		175,000	268,907	271,868	283,556	316,091	354,380	351,734	341,632
ANNUAL BALANCE		93,907	2,962	11,687	32,536	38,288	(2,645)	(10,102)	260
CUMULATIVE BALANCE		268,907	271,868	283,556	316,091	354,380	351,734	341,632	341,892
WORKING CAPITAL RESERVE FUND TARGET									
EMERGENCY RESERVE		25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
SALES RESERVE		150,400	188,300	222,600	258,400	266,100	272,900	281,000	289,400
OPERATING RESERVE		24,098	26,846	30,133	33,871	38,212	42,955	47,922	53,747
TOTAL FUND TARGET		199,498	240,146	277,733	317,271	329,312	340,855	353,922	368,147

TABLE 21 (Continued)

CURRENT AND PROJECTED WATER RATES
WITHOUT SEASONAL STORAGE
ALTERNATIVE C
[IN 000'S]

	FISCAL YEAR									
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
REVENUE REQUIREMENTS	\$1,532,208	\$1,567,841	\$1,672,637	\$1,777,799	\$1,882,175	\$1,988,693	\$2,108,296	\$2,264,074	\$2,413,566	\$2,591,279
REVENUE RECOVERY										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED	104,646	113,116	121,519	128,802	136,084	143,367	150,650	157,933	172,498	187,064
TREATED	189,951	203,980	217,860	229,720	241,581	253,441	265,302	277,163	299,947	322,732
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED	436,130	469,513	502,578	530,996	559,413	587,830	616,247	673,082	729,916	790,810
TREATED	786,464	841,746	896,360	942,639	988,919	1,035,198	1,081,477	1,170,383	1,259,288	1,354,283
SEASONAL										
UNTREATED	0	0	0	0	0	0	0	0	0	0
TREATED	0	0	0	0	0	0	0	0	0	0
TOTAL	\$1,517,192	\$1,628,354	\$1,738,317	\$1,832,157	\$1,925,997	\$2,019,837	\$2,113,677	\$2,278,560	\$2,461,650	\$2,654,889
ANNUAL BALANCE	(\$15,017)	\$60,513	\$65,680	\$54,357	\$43,821	\$31,143	\$5,381	\$14,486	\$48,084	\$63,610
SALES										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED	204	206	208	208	208	208	208	208	208	208
TREATED	305	309	312	312	312	312	312	312	312	312
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED	794	804	812	812	812	812	812	812	812	812
TREATED	1,192	1,206	1,218	1,218	1,218	1,218	1,218	1,218	1,218	1,218
SEASONAL										
UNTREATED	0	0	0	0	0	0	0	0	0	0
TREATED	0	0	0	0	0	0	0	0	0	0
TOTAL	2,495	2,525	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550
RATES										
UNTREATED NON-INTER. WATER RATE	\$549	\$584	\$619	\$654	\$689	\$724	\$759	\$829	\$899	\$974
INCREASE OVER PRIOR YEAR	\$35	\$35	\$35	\$35	\$35	\$35	\$35	\$70	\$70	\$75
TREATMENT SURCHARGE	\$111	\$114	\$117	\$120	\$123	\$126	\$129	\$132	\$135	\$138
SEASONAL UNTREATED	\$392	\$420	\$448	\$476	\$504	\$532	\$560	\$616	\$672	\$732
SEASONAL TREATED	\$473	\$504	\$534	\$564	\$595	\$625	\$656	\$714	\$772	\$835
WORKING CAPITAL RESERVE FUND										
BEGINNING BALANCE	341,892	326,875	387,388	453,068	507,425	551,246	582,390	587,771	602,256	650,340
ANNUAL BALANCE	(15,017)	60,513	65,680	54,357	43,821	31,143	5,381	14,486	48,084	63,610
CUMULATIVE BALANCE	326,875	387,388	453,068	507,425	551,246	582,390	587,771	602,256	650,340	713,950
WORKING CAPITAL RESERVE FUND TARGET										
EMERGENCY RESERVE	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
SALES RESERVE	307,800	326,200	344,600	363,000	381,400	399,800	418,200	454,100	490,000	528,400
OPERATING RESERVE	60,362	67,771	76,069	85,363	95,772	107,429	120,486	135,110	151,489	169,833
TOTAL FUND TARGET	393,162	418,971	445,669	473,363	502,172	532,229	563,686	614,210	666,489	723,233

TABLE 22

CURRENT AND PROJECTED WATER RATES
WITHOUT SEASONAL STORAGE
ALTERNATIVE D
[IN 000'S]

	FISCAL YEAR									
	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	
REVENUE REQUIREMENTS		\$514,143	\$765,258	\$958,515	\$1,150,523	\$1,212,540	\$1,310,815	\$1,381,557	\$1,437,856	
REVENUE RECOVERY										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED		36,484	45,174	60,636	76,961	90,563	94,289	98,131	103,011	
TREATED		64,340	81,112	110,003	137,176	160,802	169,489	177,580	186,080	
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED		172,498	222,136	285,455	351,696	360,751	375,437	394,415	413,673	
TREATED		309,727	402,989	508,793	624,463	648,467	679,398	712,479	747,192	
SEASONAL										
UNTREATED		0	0	0	0	0	0	0	0	
TREATED		0	0	0	0	0	0	0	0	
TOTAL		\$583,050	\$751,410	\$964,887	\$1,190,296	\$1,260,583	\$1,318,614	\$1,382,605	\$1,449,956	
ANNUAL BALANCE		\$68,907	(\$13,848)	\$6,371	\$39,773	\$48,043	\$7,800	\$1,048	\$12,100	
SALES										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED		164	168	179	188	189	193	197	200	
TREATED		247	252	268	282	284	289	295	301	
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED		641	655	698	734	738	752	767	782	
TREATED		962	983	1,047	1,101	1,107	1,129	1,151	1,173	
SEASONAL										
UNTREATED		0	0	0	0	0	0	0	0	
TREATED		0	0	0	0	0	0	0	0	
TOTAL		2,014	2,058	2,192	2,306	2,317	2,363	2,410	2,456	
RATES										
UNTREATED NON-INTER. WATER RATE	\$222	\$269	\$339	\$409	\$479	\$489	\$499	\$514	\$529	
INCREASE OVER PRIOR YEAR	\$25	\$47	\$70	\$70	\$70	\$10	\$10	\$15	\$15	
TREATMENT SURCHARGE	\$39	\$53	\$71	\$77	\$88	\$97	\$103	\$105	\$108	
SEASONAL UNTREATED	\$130	\$168	\$224	\$280	\$336	\$344	\$352	\$364	\$376	
SEASONAL TREATED	\$154	\$203	\$273	\$334	\$399	\$414	\$427	\$440	\$455	
WORKING CAPITAL RESERVE FUND										
BEGINNING BALANCE		175,000	243,907	230,059	236,431	276,204	324,247	332,047	333,095	
ANNUAL BALANCE		68,907	(13,848)	6,371	39,773	48,043	7,800	1,048	12,100	
CUMULATIVE BALANCE		243,907	230,059	236,431	276,204	324,247	332,047	333,095	345,195	
WORKING CAPITAL RESERVE FUND TARGET										
EMERGENCY RESERVE		25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	
SALES RESERVE		150,400	190,800	227,600	265,900	273,600	280,400	288,500	296,900	
OPERATING RESERVE		24,098	26,846	30,133	33,871	38,212	42,955	47,922	53,747	
TOTAL FUND TARGET		199,498	242,646	282,733	324,771	336,812	348,355	361,422	375,647	

TABLE 22 (Continued)

CURRENT AND PROJECTED WATER RATES
WITHOUT SEASONAL STORAGE
ALTERNATIVE D
[IN 000'S]

	FISCAL YEAR									
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
REVENUE REQUIREMENTS	\$1,557,208	\$1,592,841	\$1,697,637	\$1,802,799	\$1,907,175	\$2,013,693	\$2,133,296	\$2,289,074	\$2,438,566	\$2,616,279
REVENUE RECOVERY										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED	107,700	115,176	122,559	129,842	137,125	144,408	151,690	162,094	175,620	190,185
TREATED	194,532	207,070	219,420	231,281	243,141	255,002	266,863	283,405	304,629	327,414
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED	444,074	473,532	506,638	535,055	563,472	591,890	632,486	685,260	742,095	802,989
TREATED	798,380	847,776	902,449	948,729	995,008	1,041,287	1,105,835	1,188,651	1,277,556	1,372,551
SEASONAL										
UNTREATED	0	0	0	0	0	0	0	0	0	0
TREATED	0	0	0	0	0	0	0	0	0	0
TOTAL	\$1,544,686	\$1,643,555	\$1,751,067	\$1,844,907	\$1,938,747	\$2,032,587	\$2,156,874	\$2,319,411	\$2,499,900	\$2,693,139
ANNUAL BALANCE	(\$12,522)	\$50,713	\$53,430	\$42,107	\$31,571	\$18,893	\$23,578	\$30,337	\$61,334	\$76,860
SALES										
NON-INTERRUPTIBLE - JULY/AUGUST										
UNTREATED	204	206	208	208	208	208	208	208	208	208
TREATED	305	309	312	312	312	312	312	312	312	312
NON-INTERRUPTIBLE - BALANCE OF YEAR										
UNTREATED	794	804	812	812	812	812	812	812	812	812
TREATED	1,192	1,206	1,218	1,218	1,218	1,218	1,218	1,218	1,218	1,218
SEASONAL										
UNTREATED	0	0	0	0	0	0	0	0	0	0
TREATED	0	0	0	0	0	0	0	0	0	0
TOTAL	2,495	2,525	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550
RATES										
UNTREATED NON-INTER. WATER RATE	\$559	\$589	\$624	\$659	\$694	\$729	\$779	\$844	\$914	\$989
INCREASE OVER PRIOR YEAR	\$30	\$30	\$35	\$35	\$35	\$35	\$50	\$65	\$70	\$75
TREATMENT SURCHARGE	\$111	\$114	\$117	\$120	\$123	\$126	\$129	\$132	\$135	\$138
SEASONAL UNTREATED	\$400	\$424	\$452	\$480	\$508	\$536	\$576	\$628	\$684	\$744
SEASONAL TREATED	\$481	\$508	\$538	\$568	\$599	\$629	\$672	\$726	\$784	\$847
WORKING CAPITAL RESERVE FUND										
BEGINNING BALANCE	345,195	332,673	383,386	436,816	478,923	510,495	529,388	552,966	583,303	644,637
ANNUAL BALANCE	(12,522)	50,713	53,430	42,107	31,571	18,893	23,578	30,337	61,334	76,860
CUMULATIVE BALANCE	332,673	383,386	436,816	478,923	510,495	529,388	552,966	583,303	644,637	721,496
WORKING CAPITAL RESERVE FUND TARGET										
EMERGENCY RESERVE	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
SALES RESERVE	312,800	328,700	347,100	365,500	383,900	402,300	428,200	461,600	497,500	535,900
OPERATING RESERVE	60,362	67,771	76,069	85,363	95,772	107,429	120,486	135,110	151,489	169,833
TOTAL FUND TARGET	398,162	421,471	448,169	475,863	504,672	534,729	573,686	621,710	673,989	730,733

PROJECTED WATER RATES WITHOUT SEASONAL STORAGE

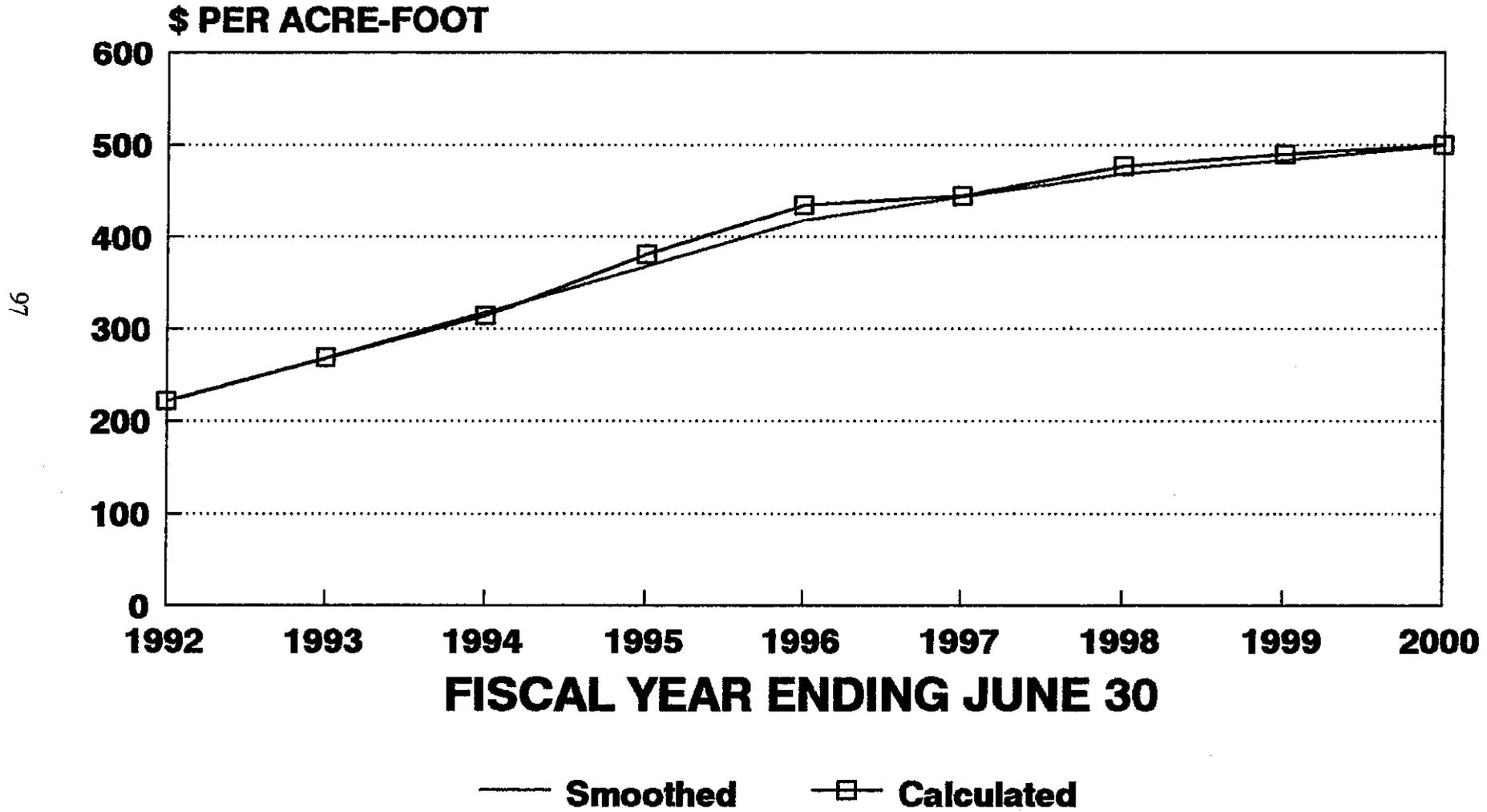


FIGURE 9

ALTERNATIVE WATER RATES WITHOUT SEASONAL STORAGE

86

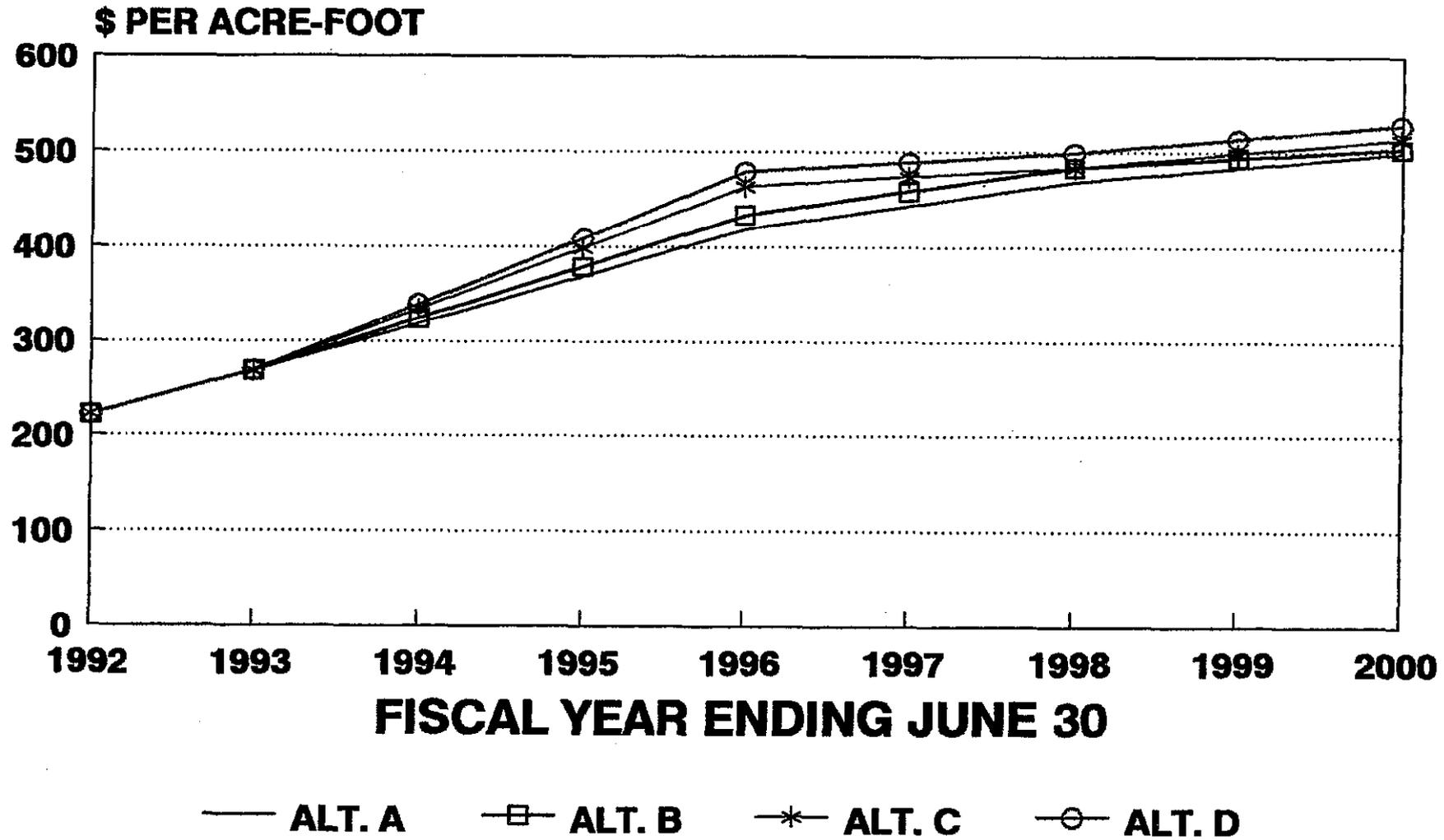


FIGURE 10

SEASONAL STORAGE PROGRAM IMPACT ALTERNATIVE A

66

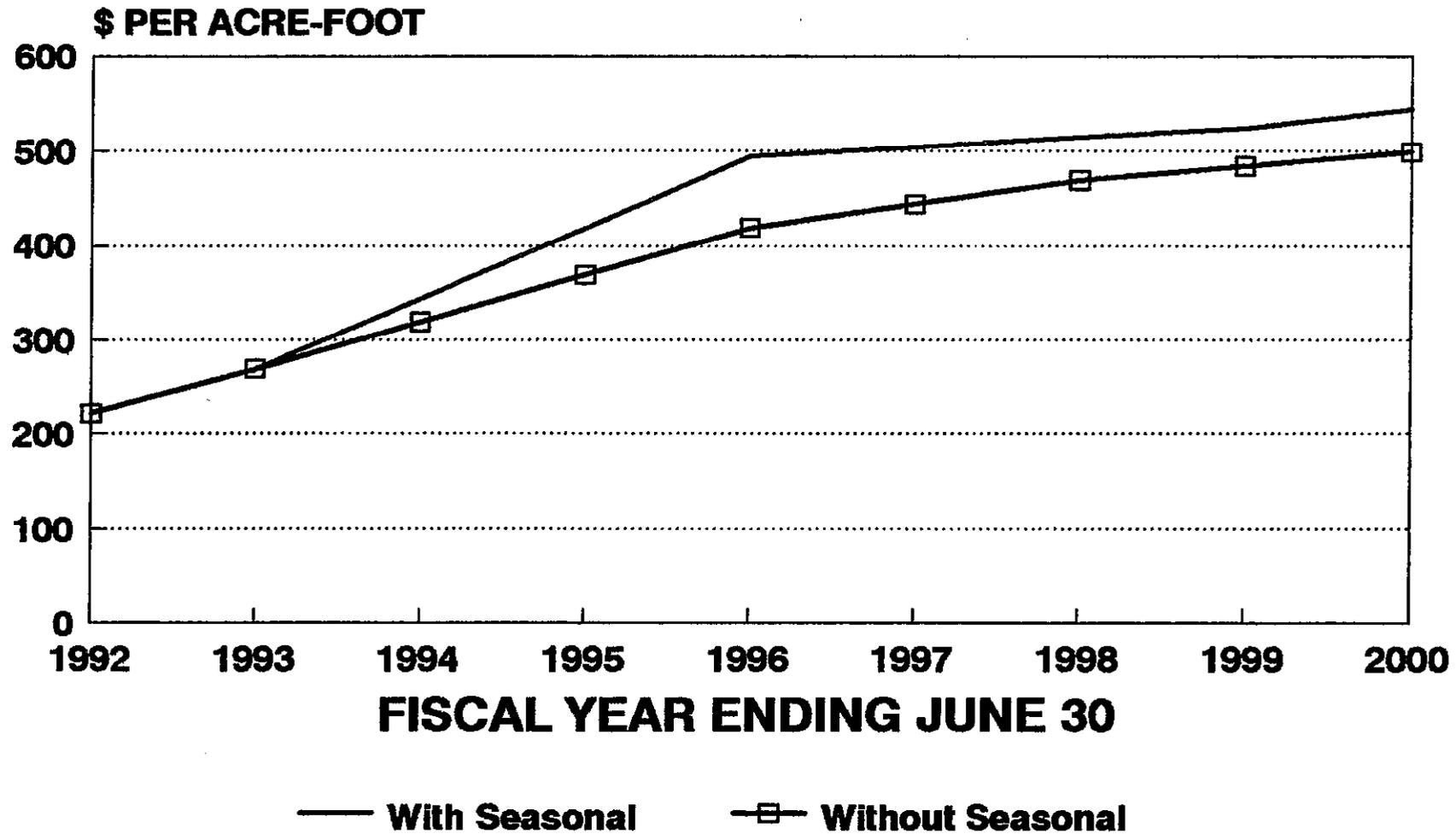


FIGURE 11

program requires water rates to be about 10 percent greater than they would otherwise need to be. Put another way, the program has the effect of reducing water sales for revenue generation purposes from about 2,000,000 acre-feet per year to about 1,830,000 acre-feet.

ACTIONS WHICH COULD REDUCE RATE INCREASES

There are many actions which would help reduce the indicated water rate adjustments, either with or without the seasonal storage program.

Connection Charges

Metropolitan could initially set the level of connection charges to generate greater amounts of revenue. While higher charges may be justified, it may be more difficult to implement an initial charge which exceeds levels assumed herein. Metropolitan could increase the connection charge on an annual basis. That is a common utility practice and would be justified as costs increase due to inflation. The benefit from increasing connection charges regularly to match inflation could be about a \$25 per acre-foot lower noninterruptible water rate by the year 2010.

Standby and Service Charges

Either or both of these charges could be increased to generate additional revenues. An increase in the standby charge to \$10 per parcel next year and beyond would help to reduce the indicated 1993-94 rate adjustment by about \$10. A doubling of the service charges would have a similar effect.

Water Management Programs

As water rates increase to the \$500 per acre-foot level by the year 2000, it may be possible to reduce the level of subsidies provided under the various water management programs. The cost savings could impact water rates up to \$25 per acre-foot by the year 2010 if the level of subsidies is halved.

RECOMMENDATIONS

The following recommendations are offered:

- Metropolitan needs to increase the level of integration of its financial planning models. These models should cover at least a ten-year time-frame, and link capital improvement program planning to financing and rate requirements. An additional ten-year planning horizon may be beneficial if significant CIP requirements extend past ten years.
- Financial information presented to the Board should clearly demonstrate the short term and long term water rate impacts of their decision. An

integrated long term financial planning model would enable future rate comparisons under various alternatives.

- A working capital reserve with a balance based on a potential decrease in sales totaling 500,000 acre-feet, adequate emergency reserves and routine working capital should be established. During the study period, a working capital reserve balance ranging from \$199 million in fiscal year 1992-93 to about \$700 million by the year 2010 is indicated. Working capital reserves should never be used to avoid rate increases.
- Near term financial requirements arising from the CIP may be too great to fully fund working capital reserves prior to 1996-97. Accordingly, Metropolitan will need to closely monitor revenues and expenditures until that date.
- Rate setting should not be tied strictly to annual revenue requirements. Efforts should be made to use reserves to smooth out rate adjustments, not avoid their needs. It is suggested that rates should not be decreased unless there is a permanent decrease in costs. Likewise, rates should not be increased commensurate with only a one year spike in costs. Rate setting should be done within the context of a long term plan for revenues and expenses.
- Because funding for the CIP will place significant demands on overall revenues, consideration of discontinuance of any revenue source should be deferred until financing is complete and water rate revenues are at adequate levels to fund annual requirements.

ALTERNATIVE RATE STRUCTURES

In the water utility industry there are a relatively small number of rate structures which are in use. Many of these are generally applicable for retail sales where a single rate structure must accommodate a wide range of customer usage and demand profiles. In this case, the rate structure may contain several features which attempt to match the costs associated with the service provided to the customer and the revenue produced under the particular rate form. In addition, the rate form typically is structured so as to elicit some desired customer response such as shifting usage from peak to off-peak periods or conservation.

Rates for wholesale service, on the other hand, are not structured to obtain specific retail customer responses since those responses depend almost entirely on the retailer's rate design. More common are rate forms which emphasize a price premium for service during the wholesaler's peak period. This is particularly appropriate if the wholesaler has responsibility for meeting the growth in demand.

In this section, alternative rate structures for Metropolitan are explored. They are then evaluated against a set of criteria ranging from the rate firm's ability to withstand legal challenge to enhancing conservation. However, it may be helpful to first understand the cost basis for rates.

COST BASIS FOR RATES

Rates are set based upon the costs which are incurred to provide service. In water rate making there are two costing approaches used to set rates, the embedded or accounting cost approach and the marginal cost approach. The accounting cost approach says that rates should be based on the historical accounting costs while marginal costs says that rates should be based upon future costs related to the next unit of production.

In this review of alternative rates, actual rate level values are developed to demonstrate the application of the rate to Metropolitan. In order to do this, two traditional accounting costs allocation methods are used to assign costs to categories which then serve as the basis for the rates. These methods are the base-extra capacity method and the demand-commodity method. Each method is accepted by the American Water Works Association.

The base-extra capacity method assigns costs related to providing annual quantities of water to the volume, or base component. Costs related to peaking are assigned to the extra capacity, or demand component.

The demand-commodity method assigns variable costs to the commodity component while costs related to meeting demand on the system is assigned to the demand component. Each of these methods is fully explained in the AWWA Water Rates Manual.

A detailed cost study is required in order to assign costs using these two methods. For this review, some gross assumptions are made with respect to the assignment of costs in order to demonstrate the rate.

In this review of alternative rates, marginal cost pricing is also discussed. However, as will be discussed, due to the difficulty in determining what the appropriate marginal costs are, example rates have not been designed based on marginal costs.

TIERED RATES

A tiered rate is one in which the unit price changes as the customer's total use during a billing period changes. If the price increases with increasing usage, the rate design is known as an increasing or inverted rate. A two-step increasing block rate would offer a specific amount of water at one price, then all additional water at a higher price.

The size of the first block is chosen so that at least some customers terminate their usage without entering the second block. Otherwise, the effect is to reduce every customer's bill by the same amount. The increasing block rate may use blocks of fixed size which apply to all customers. Alternatively, the block sizes may be variable, set individually for each customer, with the first block level perhaps set at winter usage.

There are variations to the inverted block rate structure. One variation involves a ratchet element whereby all usage, not just that falling within one block, is charged at the rate applicable to the highest block of consumption reached by a customer. By including a ratchet element, a stronger incentive to conserve is provided.

Another variation is a seasonal inverted rate. In this case, the inverted blocks rates apply only during the peak demand season. Other rate forms are used during other times of the year. The variable block structure mentioned previously may also function as a seasonal rate if the initial block is set at average use or winter usage levels.

Inverted block rate structures are proposed generally as a conservation measure based on the assumption that the potentially higher prices will induce reductions in water use. Actual results depend on the relative price elasticity of the high- and low-use customers and on the specifics of the rate structure. Typically, the rate is applied at the retail level where the first block is set at the amount of usage appropriate for minimal residential needs.

Declining block rates, where the price per unit volume decreases as the usage increases, is a traditional form of the tiered rate structure. It typically is found at the retail level of sales, but because it may be viewed as encouraging water consumption, it is less widely used in the industry than in the past. For these reasons, it is not considered in this study.

Application to Metropolitan

Because there is such a wide spread between the largest and smallest users on Metropolitan's system, only a multiple increasing block structure or a variable two-block increasing rate structure would appear to be applicable to Metropolitan.

This type of rate form is illustrated in Table 23. For this example, revenue requirements are based on 1992-93 cost and sales projections. Here, the rate during the off-peak season is a uniform volume rate. During the summer months (June, July, August, and September), the initial block rate is the off-peak rate. This second block reflects the additional cost of meeting peak demands. The second block rate is applied to all usage in the summer months which is in excess of the annual monthly average.

Legal Challenge

No legal challenge to this rate form is anticipated.

TABLE 23

INVERTED RATE STRUCTURE
Fiscal Year 1992-93

Initial Block Rate	\$228
Second Block Rate (a)	\$391

(a) Applies to summer usage above annual monthly average.

Equity

An inverted block rate will generally not reflect embedded cost causation patterns and may be considered inequitable. Large volume customers typically have good load factors, i.e., a low peak-to-average demand ratio. Thus the average unit cost to serve a large volume customer may be less than a lower volume customer with a poor load factor. This cost pattern is not reflected in an inverted rate structure.

In addition, a multiple fixed block structure may lead to an exaggeration of the rate differential between the initial blocks and the tail block. This occurs because a disproportionate amount of the revenue is recovered through the higher blocks, which in order not to exceed Metropolitan's revenue requirement, could cause the rate level of the lower blocks to be quite small.

From a marginal cost approach, the variable block structure may be more equitable since all sales above some average level may be priced at the higher rate which may reflect marginal cost or at least be closer to marginal cost.

Consistency with Metropolitan Policy

This rate structure does not appear to be inconsistent with Metropolitan policies.

Implementation and Administration

The development and implementation of an inverted-block rate structure requires a full billing analysis and a study of the impact on the various wholesale customers. Furthermore, an analysis of the impact on usage and Metropolitan's revenues should be undertaken. This analysis should include at least an evaluation of the impact on retail rate design and any price elasticity effects, and an estimate of the wholesale customer abilities to shift purchases to other time periods.

Modifications to the existing billing system would be required in order to reflect the inverted rate. If a variable block rate were adopted, each customer would in effect have different size blocks and be billed accordingly. In general, the administration of this rate would be more difficult than the current uniform rate.

Customer Acceptance

While the concept of the inverted rate structure is relatively straightforward and Metropolitan's customers are sophisticated users, the impact of the rate on individual customers may be difficult to anticipate and will cause some level of uncertainty to be experienced. Some customers may experience significant negative financial impacts. It may also be difficult to adequately reflect the block structure impact in their own retail rates. For example, changes in retail consumption may cause an agency's revenues to increase uniformly, while its cost of purchased water would increase at an increasing rate.

A variable block structure may be easier to translate to retail rates. However, as discussed previously, customers with high peak to average demand ratios may find their purchased water cost increasing more than it would otherwise do under the current uniform block rate.

Revenue Stability

Inverted block rates can result in revenue erosion and revenue instability. It is expected that the increasing block structure would inherently reduce consumption levels and cause a reduction in revenues. Furthermore, because more of the overall revenue requirement is being recovered through the sales of water at a higher block rate, a reduction in consumption would have more of an impact on revenues than the same reduction of sales under the current uniform rate structure.

The magnitude of the change in sales is difficult to predict because of such variables as weather, economic conditions, pricing and retail customer response. In addition, if the block(s) are designed so that a large proportion of summer sales is subject to the higher block rates, then revenues adequacy may be impaired.

Conservation Impact

Inverted block rates are primarily intended to encourage water use reduction at the retail level, particularly from large volume users. At the wholesale level, inverted rates will lead to reduced sales only if the purchasing agency can pass the price signal to its customers in a fashion to obtain the desired response. Reduced sales may also occur if the purchasing agency finds it less expensive to produce its own water than to buy water under the inverted rate. This would not, however, lead to conservation overall.

A shift in consumption might also occur if the agency found it less expensive to buy water at the lower block rate and store it for consumption at a later time when it would otherwise be subject to the higher block rate. This response would not reduce consumption.

UNIFORM VOLUME RATE

The simplest form of a wholesale rate is a uniform volume rate. Metropolitan's current rate form is a uniform volume rate. A recent survey of over 200 retail water purveyors in California found that some 59 percent have uniform volume rates. Such rates may be derived on a customer class basis or be the same for all. Metropolitan's Act calls for uniform rates for all customers for a respective class of service. Thus, all member agencies pay the same rate for each type of service.

Legal Challenge

No legal challenges are anticipated if Metropolitan continues its present rate form.

Equity

Uniform volume rates fail to recover from each customer the cost related to serving that customer. Such rates do not distinguish between a customer with a very steady and predictable load factor, and one which only peaks on the system. Customers only peaking on a system require considerable investment in capital facilities and related operating costs to meet those peak requirements, yet may not use sufficient quantities of water to recover those costs.

Consistency with Metropolitan Policy

Uniform volume rates are consistent with current policy.

Implementation and Administration

Again, because Metropolitan already uses uniform volume rates, their continuation would not require additional efforts to implement or administer.

Revenue Stability

Uniform volume rates are inherently unstable, in that revenue produced is a function of sales. Because Metropolitan has a large and varied service area, that instability is moderated through diversity. That is, while one member agency may from time to time have, or choose to utilize additional local storage, another may find the need to purchase additional water for Metropolitan. Only in years when the entire region is subjected to cool, wet weather, or required to reduce purchases due to limited supplies, will revenue stability be a major problem.

Conservation Impact

Uniform volume rates are not the most appropriate rate form for encouraging conservation. Since all water is priced the same, no price signal is given that either ever increasing use or high levels of peaking cost more due to the need for additional facilities and/or water purchases.

DEMAND RATES

A demand-commodity rate structure is a two or more part rate which charges both for the volume of water consumed and for the peak rate of flow or demand on the delivery system. The demand charges reflect the cost of system capacity which is required to meet the customers' maximum demands while the commodity charge includes variable costs, such as electricity and chemicals, and fixed costs related to meeting average demand.

The rate form allows for variations in the definition of the measurement of the customer maximum demand. The measured demand may be the customer's non-coincidental maximum hour, maximum day, maximum week, or maximum month. The demand may also be measured coincident with the system's maximum demand. Practically speaking, the expense of demand metering and additional administrative effort required will dictate how the demand is measured. It possible to have a separate demand charge for several measures of peak demand.

For a wholesale supplier with a defined peak season, the demand-commodity rate typically functions as a seasonal rate. Under this application of the rate, the customer's maximum demand is measured during the utility's peak season. This demand then is the billing demand each subsequent month until the next peak season, at which time a new maximum demand may be established. This form of the rate causes the revenues from the demand charges to be spread out evenly over the year. This form of the rate is termed a "demand rate with 100 percent ratchet".

A variation on this approach allows for the billing demand during the off-peak months to be a percentage of the maximum demand which occurred during the previous peak season. This variation causes more demand-related revenues to be recovered during the peak season.

Application to Metropolitan

For demonstration purposes, a demand-commodity rate for Metropolitan is shown in Table 24. This demonstration rate is based on 1992-93 projected revenue requirements and annual water sales. Monthly distribution of sales is based on the average of the last four years of actual sales. Example rates based upon both the base-extra capacity and the demand-commodity cost allocation methodologies are shown. Treated water surcharge and reclaimed water rates are assumed at the same levels as in Metropolitan's currently proposed rates.

This table shows that under the base-extra capacity cost allocation methodology, all usage is billed at \$216 per acre-foot throughout the year. In addition, a demand rate of \$16 per acre-foot per month is applied every month to the maximum monthly demand established during the peak season. For example, if an agency's maximum monthly consumption is 1,000 acre-feet in July, that agency will pay \$16,000 per month every month in addition to the volume charge.

TABLE 24
DEMAND-COMMODITY RATE STRUCTURE
Fiscal Year 1992-93

	<u>Base-Extra Capacity Method</u>	<u>Demand Commodity Method</u>
Demand Rate(\$/AF-month)	\$ 16	\$139
Volume Rate(\$/AF)	\$216	\$66

Under the base-extra capacity approach, approximately 6 percent of Metropolitan's costs would be recovered through the demand charge. The commodity-demand method would recover 50 percent as a demand charge.

Legal Challenge

No legal challenge to this rate form is expected.

Equity

The demand-commodity rate structure is generally considered equitable in that it charges each customer in a uniform manner for its demand on the utility's capacity requirements. The rate tracks costs, in that customers who use more system capacity during the peak period pay more than those customers who are able and willing to make the investment to shift maximum usage to off-peak periods. It is a common rate form for wholesale service.

Consistency with Metropolitan Policy

The rate structure does not appear to be inconsistent with Metropolitan policy.

Implementation and Administration

The implementation of a demand-commodity rate requires a detailed cost study to identify demand related and commodity related costs, and the modification of the billing system to accommodate two billing determinants, volume and demand.

Further, Metropolitan must determine the peak period most appropriate to measure for the customer demands, i.e., maximum day, maximum week or maximum month. Any period of time less than the present billing month will require Metropolitan to either read meters more often than is done presently or to install indicating demand meters or rate of flow controllers.

In addition, Metropolitan must determine the expected response of the agencies to such a rate. For example, the level of the demand charge should be sufficient to encourage the agencies to shift their purchases to the off-peak periods and Metropolitan must be able to anticipate the shift in order to protect its revenues and plan for supplies.

Customer Acceptance

Demand-commodity rates will negatively impact customers with high peak to average demand ratios and more specifically those who cannot either produce their own water or have storage for their off-peak purchases. In the long run the rate structure will reduce the cost of water to all customers, as Metropolitan will be able to reduce the construction of some additional facilities because member agencies will be encouraged to build their own storage or peaking facilities.

While it may be less costly in many instances for Metropolitan to build storage and peaking facilities, under the current rate structure member agencies do not receive any price signals related to such costs. Under a demand-commodity rate form, member agencies would be given a cost for demand against which they can evaluate their own projects designed to lower their demand on Metropolitan. It is assumed that the most efficient projects would then be constructed.

Revenue Stability

This rate form will contribute to revenue stability as billing for demand is spread throughout the year. However, since new billing demands are established every summer, there is still a level of uncertainty with regard to revenue recovery when the budget is formulated in the spring. However, a modification to the billing demand determination may allow the billing demands to roll forward for a period longer than one year. The billing demands and the associated revenue may be fixed with certainty for a period of two to three years under such an approach.

Table 25 demonstrates the level of revenue which could be considered fixed and variable under the two potential alternative demand-commodity rate approaches. The base-extra capacity method would raise fixed revenue to 23 percent while the commodity-demand approach could raise it to 65 percent. Under either alternative, Metropolitan would likely need to phase-in the concept of a demand charge. The benefit would be a higher level of fixed revenue.

Conservation Impact

Because a demand-commodity rate may encourage purchasers to reduce demand during the peak season, it may indirectly encourage conservation. If agencies purchase water during off-peak periods for use during the summer, the net annual usage may not be reduced. The ultimate impact on conservation will depend upon the how the agencies translate the demand-commodity rate under which they purchase water to their own retail rate structure.

MARGINAL COST PRICING

A marginal-cost rate structure is designed to set rates equal to the cost of providing the next increment, or marginal unit(s), of service to the customer.

Under this theory, water rates set at the marginal cost should send the most accurate signal to the customer as to what it costs the utility to provide the additional unit of service. Customers can then make the decision as to what they are willing to consume at the given rate. In other words, the objective of marginal-cost pricing is to promote the most efficient use of the resource by pricing at the marginal cost of production.

Despite the importance of marginal cost in rate making, no generally accepted procedure is available for identifying and measuring marginal cost in water supply operations. Techniques are well developed in the electric utility and telecommunications industries, and improving in the natural gas distribution industry. Much of the water supply marginal cost literature appeared during the 1970's and is limited to exposition of principles or simplistic examples based wholly or partly on hypothetical data. To date, only a few U.S. water utilities have ever attempted a marginal cost study. Those that have include East Bay Municipal Utility District; the cities of Santa Cruz, San Diego, and Phoenix; and Metropolitan itself (see Water Management Programs section). Los Angeles is currently studying such an approach.

True marginal cost rates are difficult to define, develop and implement. Theoretical studies tend to focus on optimal expansion of system capacity and the associated marginal capacity cost, incremental costs related to the production and distribution of water or marginal commodity cost and to the size of the customer base or marginal customer cost.

However, little guidance is provided for the proper identification and measurement of these costs at the margin. Marginal commodity costs usually include the cost of

TABLE 25
 FIXED AND VARIABLE REVENUE
 UNDER COMMODITY--DEMAND RATES
 REVENUE REQUIREMENTS PROJECTIONS FOR 1992-93
 [IN 000'S]

	BASE--EXTRA CAPACITY METHOD			DEMAND--COMMODITY METHOD		
	Total	Variable	Fixed	Total	Variable	Fixed
	\$	\$	\$	\$	\$	\$
Water Rates	534,188			534,188		
Volume		482,328			134,904	
Demand			51,860			399,284
Taxes	85,000		85,000	85,000		85,000
Standby Charges	25,000		25,000	25,000		25,000
Service Charges	25,000		25,000	25,000		25,000
Interest / Miscellaneous	40,750	40,750		40,750	40,750	
Power Sales	20,000	20,000		20,000	20,000	
Stabilization Fund	94,638	94,638		94,638	94,638	
Total	824,576	637,716	186,860	824,576	290,292	534,284
Percent	100.00%	77.34%	22.66%	100.00%	35.21%	64.79%

electric energy for pumping, water treatment chemicals, certain plant operation expenses, certain pump and storage maintenance, and other costs. Marginal customer costs incorporate the cost of meter reading, billing and collection, customer account maintenance, and other costs that vary with the number of customers connected to the system.

In addition to the difficulties in the measurement of marginal cost, one of the most significant problems is that the utility will very likely recover more than its revenue requirements. Over recovery of the revenue requirement results because rates are set on the basis of larger and more expensive plant and supply as compared to the plant and supply actually in service. Over recovery results because long-term marginal-cost rates are higher than rates based on average costs. The surplus revenue can be substantial, especially for utilities that are experiencing rapid growth. The utility is usually limited by law or by regulation to recovering average accounting costs. Thus the utility is confronted with the problem of reconciliation of the excess revenues generated from these higher marginal-cost rates with its actual revenue requirements based on average costs.

Utilities implementing modified marginal-cost rates deal with the over recovery of revenue in different ways. The surplus revenue can be used to offset customer service costs (fixed costs related to meter reading, billing, and capital costs related to meters and services) and create a rate structure that is more commodity-based. The revenues surplus can also be used to finance future capital improvements and other facilities required to meet increasing demands. Finally, the surplus revenues could be used to fund water conservation and education programs.

The usual approach to reconciling surplus revenues is to develop rates based on marginal costs, determine the revenues generated under those rates using projected sales, and then to scale down the marginal cost rate levels by the ratio of the marginal cost revenues to the average cost based revenue requirement. In practice, the resulting rate structures resemble more traditional and modern accounting cost based rate structures. It is not unusual to find volume rates, demand-commodity rates and inverted rates, as well as other variations on seasonal rates, based on marginal cost principles. In practice, the difference between marginal and embedded cost based rates simply becomes the amount of revenues recovered by the different rate structure components, i.e., volume versus demand, off-peak versus on-peak or initial block versus tail block.

Application to Metropolitan

Metropolitan currently has five programs based upon marginal cost pricing principles. The Local Projects Program (LPP) currently provides a direct payment of \$154/AF for qualifying projects that reclaim and reuse water. Water reclamation and reuse projects directly offset the need for additional imported supplies. At the present time, each acre-foot of reclaimed water displaces the need to purchase water from Metropolitan that can cost up to \$261/AF. Combined with the direct LPP payment

of \$154/AF, the LPP creates a net financial incentive for reclamation that is equivalent to raising the marginal wholesale water rate from \$261 to \$415/AF.

In 1988, Metropolitan implemented the Conservation Credits Program (CCP), whereby Metropolitan currently pays up to \$154/AF for water saved through the adoption of effective conservation programs by water agencies. Like the LPP, the CCP creates a net financial incentive equivalent at the margin to raising wholesale water rates up to \$415/AF.

The Seasonal Storage Program was adopted in 1989 to provide an incentive for member agencies to purchase water between October 1 and April 30 for local storage. The rates provide for a summer-winter price differential. The price of the water sold in the winter reflects the short-term marginal cost of the water at that time. In 1990-91 approximately 16 percent of all Metropolitan deliveries were under the seasonal storage rate.

In late 1990, Metropolitan and member agencies implemented the Incremental Interruption and Conservation Plan (IICP). Under this plan, each agency is assigned a monthly conservation target from Metropolitan. The plan is structured so it can be staged or phased to allow Metropolitan to require different levels of conservation. The program provides penalties for usage over target quantities. The effect of this program is an inverted block rate structure where the tail block is set at a level to produce the desired customer response and which reflects in some fashion the perceived marginal cost of the incremental unit sold.

The Ground Water Recovery Program (GRP) adopted in 1991 is designed to provide up to \$250 per acre-foot in financial assistance to member agencies for local ground water supply projects. This is very similar to the LPP in that it effectively raises the marginal cost of water.

Metropolitan may wish to consider marginal cost based rates for its water rates. However, the difficulty in defining and measuring those costs precludes any development of such rates in this study and it is not clear that the implementation of such rates would necessarily benefit Metropolitan or its member agencies.

Equity

Since marginal-cost rates for the District are higher than average cost rates, they do not reflect the current cost of service. Modifying the rate structure to reconcile excess revenue may further diminish equity. Customers would also be paying rates based, in part, on water facilities that have not been constructed nor which the utility has current cost responsibility.

Consistency with Metropolitan Policy

This approach to rate setting does not appear to be inconsistent with Metropolitan policy.

Implementation and Administration

Marginal-cost pricing structures can be very complex to develop, explain, and understand. A thorough marginal cost study must be conducted by Metropolitan before any rates can be implemented. The form of the rate, however, can be relatively simple such as those described in this report.

Customer Acceptance

When moving from a traditional rate structure to one based on marginal-cost pricing, there will likely be significant impacts on some customers. Generally, high-volume users will be the most severely impacted. This impact is dependent on how the excess revenues are handled and reconciled with the utility's revenue requirements. In addition, it may be difficult to adequately reflect the marginal cost based wholesale rates in the member agencies retail rate structures.

Revenue Stability

True marginal-cost rates would be higher for Metropolitan than rates based on average or embedded costs and thus a revenue surplus would be generated. Scaling down the revenue recovered to revenue requirements but leaving the marginal-cost based rate structure intact would address the excess revenue problem, but would not address the impact on customer demand. Therefore, as with any new rate structure, a comprehensive demand model must be developed to estimate the degree of demand volatility if marginal-cost rates were implemented. In general, revenue stability will depend more heavily upon the rate structure rather than the cost basis.

Conservation

A major objective of marginal-cost pricing is to ensure efficient use of the utility's facilities and water resources. If a marginal-cost rate is properly designed, it can promote this objective.

LIFE-LINE RATES

The concept of life-line rates has become very prevalent at the retail level for a variety of utilities throughout the United States. The purpose of such programs is to offer basic service below cost to disadvantaged groups. Such programs often target low income or elderly citizens.

Because services are provided below cost to qualifying groups, rates for other users must be higher. Depending upon the extent of below cost service provided, the impact on other users tends to vary from imperceptible to minimal. Life-line rate programs, with very few exceptions, result in minor revenue losses.

Applicability to Metropolitan

Life-line rates at the wholesale level generally do not exist. For Metropolitan it would be difficult to characterize a member agency as disadvantaged. It would also be very difficult to structure an equitable rate applicable to all agencies which offered some quantity of water below cost.

It would be possible, however, to offer water at a discount to member agencies if those agencies in turn offered it at a discount through a well designed life-line rate structure. Such a program would likely have negligible impact on Metropolitan's rates and revenues if the discount given is not excessive. Typically, well designed life-line rate programs specifically target only qualified users and result in very limited sales at a discount.

SUMMARY

Table 26 is a summary of the evaluation factors for each alternative rate form discussed. The demand-commodity and uniform volume rate forms are rated the highest overall. Recognizing that equity and revenue stability are generally most important factors to the Board, the demand-commodity rate form is rated higher.

RECOMMENDATIONS

- Metropolitan should explore implementation of a rate form which recognizes both the volume of water purchased and the peak demand placed on its system by member agencies. Such a rate form would enhance overall equity and improve revenue stability.
- A detailed cost allocation study should be undertaken to determine appropriate, cost based commodity-demand rate structures.
- Commodity demand rates should be phased in and seasonal storage rates phased out. Member agencies could develop long term capital programs which include appropriate storage if Metropolitan enacts demand-based rates.

TABLE 26

EVALUATION OF ALTERNATIVE WATER RATE STRUCTURES

CRITERIA	DEMAND COMMODITY	UNIFORM RATE*	TIERED	LIFE-LINE	MARGINAL COST
1. No Legal Challenge	High	High	High	Medium	Low
2. Enhances Equity	High	Medium	Medium	Low	Low
3. Consistent with Policy	Medium	High	Medium	Medium	Medium
4. Easy to Administer	Medium	High	Medium	Low	Low
5. Easy to Implement	Medium	High	Low	Low	Low
6. Enhances Revenue Stability	High	Medium	Low	Low	Low
7. Aids Conservation	Medium	Medium	High	High	High

*Currently used

EQUITY CONSIDERATIONS

The objective of this task of the study was to identify alternative accounting methods which might enhance Metropolitan's equity position. The purpose of the review was to determine if, under Generally Accepted Accounting Principles, alternatives to current Metropolitan procedures were available.

The review included discussions with management level personnel within the Finance Division. In addition, a number of documents relevant to the accounting procedures were reviewed. A summary of the procedures reviewed and preliminary findings is presented in this section.

CONSERVATION EXPENSE CAPITALIZATION

Metropolitan expenses the costs of its conservation programs as incurred. This policy was reviewed to determine whether capital treatment may be appropriate in the circumstances for all, or part of, such costs.

Capital treatment may generally be appropriate in two circumstances. A discussion of whether Metropolitan's circumstances apply follows:

- Generally, program expenditures which result in an asset to which an enterprise holds title and which will benefit future periods, qualify for **capitalization** and amortization over the period of benefit. In the case of the program expenditures examined, Metropolitan does not retain title, but subsidizes the purchase of assets by its member agencies and their constituents. In addition, the future benefit of the conservation equipment is reduced water use; although such reduced use may result in a reduction to Metropolitan's capital program, it also results in lower future revenues through reduction of volume. Also, any such net benefit would be difficult to quantify. Therefore, it is believed that capital treatment is not justified on this basis.
- A second alternative examined is the deferral of such costs through the application of Statement of Financial Accounting Standards No. 71, "Accounting for the Effects of Certain Types of Regulation." This Statement provides for **deferral accounting** under certain circumstances where rate actions of a regulator permit future recovery of an expenditure. This Statement is not applicable to Metropolitan as conservation program costs are recovered through inclusion within recovered operating expenses in the year incurred. As such costs are recovered currently, treatment as an operating expense of the current period provides proper matching and capitalization is not available.

AMORTIZATION

Policies and procedures underlying the amortization of Participation Rights in State Water Project, Imperial Irrigation Project and Santa Margarita Project were reviewed.

State Water Project

State Water Project Participation rights for "on-aqueduct" and "off-aqueduct" facilities at June 30, 1991:

Capitalized costs	\$1,944,000
Less: Accumulated amortization	<u>(923,000)</u>
Net	<u>\$1,021,000</u>
Payments for rights-1991	<u>\$142,000</u>
Amortization - 1991	<u>\$92,000</u>

Metropolitan's method of amortization (described in Note 1(g) to financial statements) for "**on-aqueduct**" facilities applies the ratio of a current period's deliveries to total estimated current and future deliveries through the year 2052, against current and future estimated costs through the year 2035 to arrive at annual amortization expense. This effectively establishes a per unit cost of water delivered, based on incurred plus future estimated on-aqueduct capital costs, which is applied to total deliveries for the year in arriving at annual expense.

The policy of anticipating future capital costs in the cost of current deliveries is found to be unusual. In fact, Metropolitan is relying on state engineers for the accuracy of **two major variables** (estimates of future water deliveries and of future capital costs). If the straight-line method of amortization is used, we estimate that amortization would have been approximately \$39 million (\$1,944,000/50 years), as compared to \$92 million actually recorded.

It is recommended that Metropolitan's policy for amortizing on-aqueduct costs of the State Water Project be reevaluated. It is not suggested that the straight-line method would be more appropriate in Metropolitan's circumstances; however, a significant difference exists which warrants investigation and reaffirmation.

Imperial Irrigation Project/Santa Margarita Project

Costs capitalized as Participation Rights of the Imperial Irrigation Project are amortized on a **straight-line basis** over the contract period during which Metropolitan is entitled to water deliveries. Similarly, upon completion, costs capitalized as Participation Rights of the Santa Margarita Project will be amortized using the same methodology. Discussions with management indicate that estimates of water deliveries over the contract period are not available in such a precise manner as to be considered reliable for purposes of calculating a per unit delivered cost over the contract period.

As such, the straight-line amortization used by Metropolitan appears to be the most appropriate method.

OFF-BALANCE SHEET FINANCING

Off-balance sheet financing generally refers to the financing of a project or asset without recording the asset or liability on the balance sheet of the user. Generally, a third party investor holds the asset and related debt. Parties contracting for the use of the asset pay a rent or charge for such use, most of which is used by the third party to service the debt. The object of the transaction is to finance an asset by keeping the asset or related debt off-balance sheet. This type of transaction is frequently covered by a formal **take-or-pay contract** which is used as collateral to guarantee payment of the debt. For example, a number of electric utilities are parties to major long-term purchase power contracts which they entered as an alternative to the construction and financing of new generation facilities.

Through discussion with District management, two scenarios were found where off-balance sheet financing could potentially be used:

- To finance Metropolitan's share of participation in a project, and
- To finance construction of facilities for member agencies which are subsidized by Metropolitan under its water management programs.

It is not indicated that off-balance sheet financing would be of advantage to Metropolitan in improving its debt-to-equity ratio position in either of the above situations. Specifically, if off-balance sheet financing were substituted for direct financing of participation rights, there would be no improvement to Metropolitan's equity as both the asset and liability would be removed from the balance sheet, resulting in no effect on Metropolitan's equity. As to the second scenario, in certain cases Metropolitan takes on the financing for projects of certain of its member agencies which can not afford to undertake the project independently. Opportunity for off-balance sheet financing is unlikely in this situation as lenders will require the debt be guaranteed and serviced by Metropolitan. Hence, the debt would be an obligation of Metropolitan and would have to be brought on to the balance sheet.

Significant off-balance sheet financing opportunities no longer appear to be available to utilities. The accounting profession has had a major project on its agenda dealing with financial instruments and off-balance sheet financing. In addition, rating agencies have recently begun to characterize capacity obligations under long-term power contracts as some type of debt. The balance sheet-type treatment of these commitments has had a negative impact on computing fixed charge ratios and has resulted in downgrading of credit ratings of certain utilities. Standard & Poor's credit evaluation of Metropolitan considers its obligation to the State Water Project as debt for one of the coverage calculations.

BORROWING RESTRICTION

Metropolitan must adhere to the following borrowing restriction under Section (239.2) of the Metropolitan Water District Act:

"No revenue bonds shall be issued under this chapter, except for refunding, unless the amount of equity of Metropolitan, as shown on its balance sheet as of the end of the last fiscal year prior to the issuance of such bonds, equals at least 100% of the aggregate amount of revenue bonds to be outstanding following the issuance of such bonds."

Key data of Metropolitan's financial position at March 31, 1992 are:

General Obligation Bonds	<u>\$700,000</u>
Revenue Bonds	<u>\$650,000</u>
Equity	<u>\$2,300,000</u>

The Letter From the General Manager included in Metropolitan's 1991 Annual Financial Report disclosed its \$6 billion capital improvement program. This program will require significant debt financing during the construction period. The most significant restriction to Metropolitan's borrowing capacity is the above noted debt-to-equity ratio requirement. This requirement effectively restricts its **revenue bond debt capacity** to the amount of its equity and appears to allow for future revenue bond debt equal to approximately \$1,700 million plus amounts of future equity increases.

An analysis was performed to determine how the Metropolitan-type borrowing restriction compare to the policies of comparable utilities in the financial marketplace. Recent annual reports of thirty larger municipal/government owned utilities were obtained and the Metropolitan-type restrictions were compared to those of the selected utilities. It was found that debt to equity covenant restrictions are not readily identified within the footnotes to the annual reports. Alternatively, the debt-to-equity ratios from the available information were calculated for each of the selections. It was found that the average debt-to-equity ratio among the selected utilities is approximately 4.5 to 1 and that nine of thirty-three had ratios of less than 1 to 1. Table 27 presents the results of the survey.

It appears that Metropolitan has a severely restrictive covenant which may be correctable only through Metropolitan Board action leading to revision in the District's Act.

LAND SALES

Alternative uses of excess land inventory and other real estate assets should be evaluated as potential cash generators.

Metropolitan has in-place a procedure for tracking and evaluating its **land inventory**. It is suggested that such procedure include a report, which arranges land and real

TABLE 27

SUMMARY OF DEBT/EQUITY INFORMATION
FOR SELECTED UTILITIES
[IN MILLIONS]

Name	Year	Revenue Bonds	General Obligation	Other Debt	Total Debt	Equity	Debt/Equity Ratio
Metropolitan Water District of So. Cal.	1991	\$357	\$700	\$231	\$1,288	\$2,296	0.56
Los Angeles Department of Water & Power (1)	1991	2,146		90	2,236	2,117	1.06
Los Angeles Department of Water & Power (2)	1991	442			442	991	0.45
Municipal Energy Agency of Nebraska	1991	42		2	44	4	11.00
Tennessee Valley Authority	1991	18,585		1,334	19,919	4,811	4.14
Washington Public Power Supply System (3)	1991	9,436			9,436	(3,889)	(2.43)
Jacksonville Electric Authority (4)	1991	714			714	487	1.47
Jacksonville Electric Authority (5)	1991	1,998			1,998	110	18.16
Florida Municipal Power Agency	1991	593		7	600	4	150.00
Northern California Power Agency	1991	1,516			1,516	33	45.94
City of Burbank -- Water and Electric Funds	1991	27			27	85	0.32
City of Colorado Springs -- Dept. of Utilities	1991	351		80	431	762	0.57
Lansing Board of Water and Light	1991	14		4	18	306	0.06
City of Philadelphia Water Department	1991	1,401	33		1,434	500	2.87
City of Detroit Water Department	1991	251			251	349	0.72
Massachusetts Water Resources Authority	1991	852			852	2,232	0.38
Kansas Municipal Energy Agency	1990	19			19	2	9.50
North Carolina Municipal Power Agency Number One	1990	2,494			2,494	23	108.43
North Carolina Eastern Municipal Power Agency	1990	3,149			3,149	5	629.80
Massachusetts Municipal Wholesale Electric Company	1990	1,427		1	1,428	0	NA
Sacramento Municipal Utility District	1990	1,645	1	196	1,842	119	15.48
Seattle City Light	1990	489			489	339	1.44
The Municipal Electric Authority of Georgia	1990	3,164		1,032	4,196	271	15.48
State Water Resources Development System	1990	1,415	1,283	187	2,885	960	3.01
California Water Service Company	1990			105	105	117	0.90
Connecticut Municipal Electric Energy Cooperative	1989	107		1	108	4	27.00
Southern Minnesota Municipal Power Agency	1989	781		11	792	15	52.80
Utah Municipal Power Agency	1989	54			54	0	NA
Indiana Municipal Power Agency	1989	206			206	15	13.73
United Water Resources	1989			262	262	167	1.57
Oklahoma Municipal Power Authority	1988	267			267	5	53.40
Alabama Municipal Electric Authority	1988	140			140	0	NA
Oklahoma Municipal Power Authority	1987	267			267	4	66.75
TOTALS		\$54,349	\$2,017	\$3,543	\$59,909	\$13,244	4.52

NOTES:

- [1] Amounts relate to Power System
- [2] Amounts relate to Water System
- [3] Represents sum of 6 plants and/or energy projects
- [4] Amounts relate to Electric and Bulk Power Supply System
- [5] Amounts relate to St. Johns River Power Park

estate assets into categories by use and importance to Metropolitan. Assets which are of lesser or marginal use and importance may then be considered for sale, lease, or other alternative use, either presently or in the event of anticipated cash shortages.

In certain discussions with Metropolitan management, the question arose as to whether a sale-leaseback or like-kind exchange transaction involving any of Metropolitan's undervalued assets would result in the recognition of gain and improve equity. Under generally accepted accounting principles such transactions would not likely result in the recognition of gain by Metropolitan.

REPLACEMENT COST ACCOUNTING

The question of whether replacement cost accounting could be used to step-up to fair value any existing assets currently recorded at cost is addressed next.

Replacement cost or fair value accounting is currently not available to Metropolitan under generally accepted accounting principles. Although most investment entities (e.g., investment companies, insurance companies and real estate trusts) record their investments at fair value, use of current value accounting is currently prohibited for operating companies. We are not aware of any significant trends which may result in a change to the currently required "historical cost basis accounting" in the near term.

It is recognized that any change to Metropolitan's current accounting policies may constitute a change in accounting principle, subject to the provisions of Accounting Principles Board Opinion No. 20, "Accounting Changes," as amended.

SUMMARY

The two apparent opportunities available to Metropolitan to enhance its equity position are: a change in the amortization of State Water Project rights, and the sale of appreciated, unused land.

It is recognized that any change to Metropolitan's current accounting policies may constitute a change in accounting principle, subject to the provisions of Accounting Principles Board Opinion No. 20, "Accounting Changes", as amended.

BUDGETING

INTRODUCTION

A budget is one of the most important planning and control devices available to an organization. It translates organizational goals and objectives into needs for labor, materials and supplies, capital expenditures, and other resources. As such, a budget becomes a statement of anticipated results.

The 1991-92 Annual Budget adopted by Metropolitan's Board of Directors included estimated operating and capital expenditures of \$780.5 million and estimated receipts from water sales, taxes, interest income, power recoveries, and other sources of \$608.8 million. The estimated revenue shortfall contained in this budget is to be funded from balances in the rate stabilization fund. The size and scope of Metropolitan's operations make budgeting a key management activity. To direct its budgeting activities, Metropolitan has adopted a number of policies and procedures. These policies and procedures are intended to assure that consistency in budgetary methods is maintained throughout the organization, as well as providing a basis for management control. The appropriateness and effectiveness of these policies and procedures are the focus of this analysis.

The review and evaluation of Metropolitan's budget policies and procedures is intended to address the requirements of Section 1, Subsection (b), Part 3 of AB 1794. That portion of the bill requires Metropolitan to examine the relationship between its capital construction program, water demand forecasting, and development of its budgets and revenue requirements.

METHODOLOGY

Our analysis of Metropolitan's budget process included a review of key budget documents and interviews with selected District personnel. Both the document review and the interviews focused on the timing and sequence of the activities performed during the preparation of Metropolitan's budget. From this information, we were able to develop an understanding of the budget process and identify the interdependencies between the capital projects program, the water supply and demand forecasts, and annual operating budget.

Among the documents reviewed were:

- The General Manager's 1991-92 Budget Memorandum which establishes the District's program objectives and identifies key budget milestones.
- The Manual for Preparing Budget Estimates and Requests (Fiscal Year 1991-92).
- The Executive Summary Annual Budget (Fiscal Year 1991-92).

- The Capital Projects Program (Fiscal Year 1991-92).

Separate interviews were conducted with personnel in Finance, Engineering, Planning and Operations Divisions. All persons interviewed were asked to provide their general impressions of the budget process, as well as to provide specific comments on the integration of capital projects program and the annual budget.

CURRENT BUDGET PROCESS

The budget process used by the District occurs throughout the fiscal year and can be divided into three phases. The initial phase is **Budget Formulation and Preparation**. Budget Formulation and Preparation begins at the start in July and continues until approximately January. The second phase in the budget process is **Review and Revision**. This phase begins in December and continues until June. The final phase is **Execution and Control** which occurs throughout the fiscal year. Figure 12 presents a fiscal year calendar showing key budget milestones.

The **Formulation and Preparation** phase begins in July with the initial planning of capital projects. New projects which will require the support of the Engineering Division must be submitted by the end of August. Projects are grouped into major capital, minor capital, major maintenance and non-routine categories. Capital projects are defined as projects which cost more than \$25,000 and have an expected service life of five years or more. Projects which cost more than \$250,000 are considered as major capital projects, and those which cost less than \$250,000 are considered as minor capital projects. Major maintenance projects are defined as projects which cost more than \$10,000 but do not extend the service life of the asset.

Non-routine projects are special projects or studies which are generally administrative in nature. Each project is supported by a justification which includes:

- Purpose/expected benefit
- Description of how the project will be accomplished
- Description of the consequences of not approving the project
- Description of the alternative levels of effort and cost to accomplish the project
- Estimated cost
- Priority ranking

Engineering prepares the Capital Improvement Program. In developing the program, Engineering considers supply and demand forecasts, regulatory requirements, health and safety requirements, support requirements, required completion date, and other relevant factors. When necessary, Engineering performs preliminary analyses to

METROPOLITAN WATER DISTRICT

KEY BUDGET MILESTONES

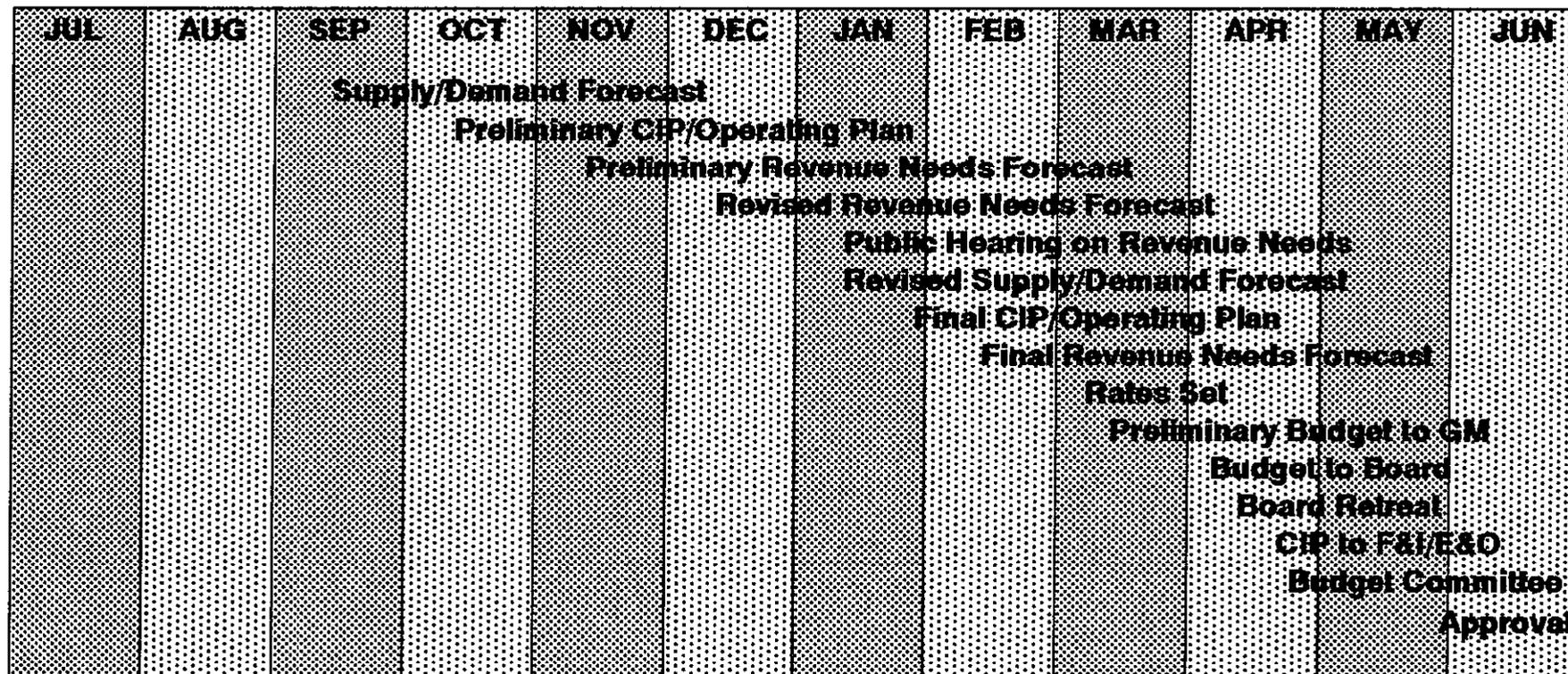


FIGURE 12

develop project cost estimates. Although Engineering develops a twenty year forecast of capital requirements, only projects funded in current year are shown in the annual budget.

In October, the General Manager sends his budget memorandum to division, branch, and section managers. The memorandum identifies major District goals for the next budget year and presents the schedule for preparing the budget.

Following receipt of the General Manager's budget memorandum, Division managers prepare five year plans. Only the first year of the plan which covers the next budget year is completed in any detail. The five year plan becomes the basis for preparing budget work sheets.

Also during October, Financial Services distributes the Personnel Budget Work sheets to branch and section managers. The work sheets show the status of budgeted positions and provide space for requesting additional personnel and new classifications. In November, the work sheets are returned to Financial Services and reviewed by a Budget Analysis Team composed of representatives from various divisions within Metropolitan. As part of the review, the Budget Analysis Team conducts interviews with managers requesting new positions. Each request for additional personnel is supported by a justification which includes: what are the primary duties, other duties, how are the duties currently accomplished, how will the position maintain or increase efficiency, and what alternatives are available to accomplish the work without the position.

Budget work sheets for operating equipment and inventory estimates are distributed by Financial Services in December. Requests for vehicles and office equipment requests are reviewed by Administrative Services Division. Automation and communication equipment requests are reviewed by Information Services Division. All requests for inventory changes greater than 10% must include an explanation. Each request for equipment is supported by a justification which includes: what the item is, where it will be used, and what it will be used for; if the item is a replacement, what it replaces and a breakdown of what it would cost to repair the old item versus purchasing a new one; if the item is not a replacement, how the method currently being used to get the job done is not sufficient or how the item will increase efficiency; if the equipment is needed for expanded functions or additional personnel; and a cost benefit analysis if the purchase is more than \$40,000.

Beginning in December and extending through February, divisional budget staffs distribute labor costs and capital project expenditures to work orders and develop program budgets. A funding budget is prepared in February. In March, all division budgets are compiled into the Annual Budget.

The second phase in the budgeting process the **Review and Revision** phase which begins in September and continues through April. The review process is divided into three distinct areas:

- Capital and major O&M
- Personnel
- Work order estimates, inventory, operating equipment requests, and program budgets

A capital and major O&M projects evaluation is performed by the Engineering Division. Engineering evaluates project cost estimates, develops an initial project schedule and assigns a priority. Following the Engineering Division evaluation, projects are reviewed by the assistant general managers. If a project is approved at this review, it is either authorized to be included in the O&M budget or assigned a project number and included in the Capital Projects Program.

The second review area is personnel budgets. In the process of preparing personnel budget, personnel requests are reviewed at the section, branch and divisional levels. In addition, the Budget Analysis Team reviews all requests for additional personnel and new classifications. The final review step occurs when the divisional personnel budgets are presented to the General Manager. Following this review step, approved personnel budget work sheets are returned to section and branch manager for labor distribution to O&M work orders and capital projects.

The third review step includes analysis of operating equipment and inventory requests, work order estimates, and program budgets. Equipment and inventory requests are reviewed at the section, branch, divisional levels. The various budget elements are allocated to work orders and then aggregated into program budgets. Division managers present their program budgets to the General Manager. A joint Engineering and Operations and Finance and Insurance Committee meeting is held to review the CIP. Following the General Manager's review, program budgets are revised as necessary and incorporated into the Annual Budget submitted to Metropolitan's Board of Directors.

The Annual Budget is review by two Board committees, the Special Budget Committee and the Finance and Insurance Committee. Following the those reviews, the Annual Budget is submitted to the full Board of Directors for approval at the June Board meeting.

The **Execution and Control** phase occurs throughout the fiscal year. Financial Services prepares and distributes a number of budget reports to enable managers to monitor their budget conformance. The available reports include:

- Budget vs. Cost Report
- Current Month and To-Date Cost Report
- Cost Inquiry by Work Order

- Labor Inquiry by Work Order
- Operation and Maintenance Cost Report

EVALUATION OF BUDGET PROCESS

Metropolitan has developed very specific budget policies and procedures. These policies and procedures define in detail the activities to be completed during the budget process and the sequence in which those activities will be performed. The budget process includes a number of intermediate budget documents and reviews. As previously mentioned, Metropolitan is a large and complex organization and the degree of control exercised in the budget preparation is necessary to assure that organizational objectives are achieved. There are, however, opportunities for improvement in the budget process. During our review, we identified the following areas where opportunities exist for improving the budget process:

- The Capital Projects Program is prepared independently of the Annual Budget. The current budget procedures do not include any analysis of the impact of completed capital projects on annual operating costs.
- The Annual Budget includes only capital projects which are funded during the budget year. Projects which begin after the budget year are not shown. Consequently, there is no adopted long range financial planning document which shows both annual expenditures and the total capital program.
- Managers responsible for budget preparation occasionally find it difficult to accurately forecast the impact of extensive and changing environmental and health and safety regulations which may affect worker productivity. Consequently, the full impact of regulatory compliance is not always reflected in the five year plans prepared by Division Managers. Meeting the costs of regulatory compliance are likely to be a significant revenue need of Metropolitan during the next ten years.
- Analysis of maintenance procedures by other consultants have indicated adequate allowances for preventive maintenance activities have not been included in the Annual Budget.
- Several of the Metropolitan personnel interviewed indicated that meeting budget submittal schedules while performing normal duties is sometimes difficult.
- Several of the Metropolitan personnel interviewed stated that the timing of capital project requests also presents difficulties. Engineering requires all requests be submitted annually by August to facilitate preparation of the CIP. Personnel from Operations would prefer submitting requests on a continuous basis.

- Several of the Metropolitan personnel interviewed stated that they believed it is unclear as to "when a Project becomes a Project." Although, the District's Budget Manual identifies the approval process, the lack of a Board approved long term capital program appears to cause confusion. The lack of a Board approved long term program also results in projects being assigned a priority on an ad hoc basis rather than in the context of a defined plan.

RECOMMENDATIONS

Based upon our review of the documents, interviews with Metropolitan personnel, and our experience in performing similar reviews, we offer the following recommendations:

- Metropolitan should prepare for adoption a formal ten year financial plan which includes both operating expenditures and capital projects. The plan would serve as the key planning document for the evaluation of capital projects. The plan should include realistic estimates of downstream operating costs of capital projects. The plan should be submitted to Metropolitan's Board of Directors for review and approval. If the plan is based on SCAG and SANDAG growth estimates it should not be subject to CEQA requirements.
- Metropolitan should continue to ensure that branch and section managers are informed of regulatory requirements affecting worker productivity and personnel requirements.
- Metropolitan should review its maintenance procedures and revise its budget estimates, as appropriate, to increase preventive and predictive maintenance activities.
- Metropolitan should continue to automate the budgeting process to facilitate its preparation with the required time constraints
- Metropolitan personnel should be encouraged to submit requests to Engineering for capital projects as their need is identified.

APPENDIX A

Assembly Bill No. 1794

APPENDIX A

ASSEMBLY BILL NO. 1794

AMENDED IN ASSEMBLY MAY 30, 1991

CALIFORNIA LEGISLATURE--1991-92 REGULAR SESSION

ASSEMBLY BILL

No. 1794

Introduced by Assembly Member Moore

March 8, 1991

An act to amend Section 134 of, and to add Section 134.3 to, the Metropolitan Water District Act (Chapter 209 of the Statutes of 1969), relating to metropolitan water districts relating to the Metropolitan Water District of Southern California.

LEGISLATIVE COUNSEL'S DIGEST

AB 1794, as amended, Moore. Metropolitan water districts *Water District of Southern California.*

(1) Under the Metropolitan Water District Act, the board of directors of a metropolitan water district is required to fix water rates to generate revenue which is sufficient for specified purposes.

This bill would require the board to fix the water rates so that the total forecast revenues for the district are equal to the total forecast expenses. The bill would require the financial assets of a district to be the minimum necessary to maintain the debt rating selected as prudent by the board and would require the board to refund any excess assets as soon as practicable to the district's member agencies or taxpayers, or both, as prescribed. The bill would make legislative findings and declarations: *metropolitan water districts may be organized for the purpose of developing, storing, and distributing water for domestic and municipal purposes and for other prescribed purposes.*

This bill would require the Metropolitan Water District of Southern California to conduct a study to investigate water

supply and demand management strategies, as prescribed. The bill would require the study to be undertaken by outside contractors and to be paid for by the district. The bill would require the study to be submitted to the Legislature and the board of the district on or before June 30, 1992.

By imposing new duties on a board the district, the bill would impose a state-mandated local program.

(2) The California Constitution requires the state to reimburse local agencies and school districts for certain costs mandated by the state. Statutory provisions establish procedures for making that reimbursement.

This bill would provide that no reimbursement is required by this act for a specified reason.

Vote: majority. Appropriation: no. Fiscal committee: yes. State-mandated local program: yes.

The people of the State of California do enact as follows:

- 1 SECTION 1. Section 134 of the Metropolitan Water
 2 SECTION 1. (a) The Metropolitan Water District of
 3 Southern California shall conduct a study to investigate
 4 water supply and demand management strategies which
 5 will result in reliable water supplies at reasonable costs,
 6 consistent with the state's goals for environmental
 7 protection.
 8 (b) The study shall investigate all of the following:
 9 (1) Rate design, including the impact of rate design on
 10 use and the development of alternative rate designs
 11 which provide stable revenues and encourage
 12 conservation.
 13 (2) Methods of forecasting water supply and demand
 14 which enable the district to more accurately forecast
 15 water sales from year to year.
 16 (3) The relationship among the district's capital
 17 construction program, water demand forecasting, and
 18 the development of budgets and revenue requirements.
 19 (4) Other matters which are determined to be
 20 relevant to the subjects identified in paragraphs (1) to
 21 (3), inclusive.
 22 (c) The study shall be undertaken by outside

1 contractors selected by the board, and shall be paid for by
2 the district. The study shall be submitted to the
3 Legislature and the board of the district on or before June
4 30, 1992.

5 District Act (Chapter 209 of the Statutes of 1969) is
6 amended to read:

7 134. (a) The board, so far as practicable, shall fix the
8 rate or rates for water to generate revenue which,
9 together with revenue from any water standby or
10 availability service charge or assessment, will do all of the
11 following:

12 (1) Pay the operating expenses of the district.

13 (2) Provide for repairs and maintenance.

14 (3) Pay the purchase price or other charges for
15 property or services or other rights acquired by the
16 district.

17 (4) Pay the interest and principal of the bonded debt
18 subject to the applicable provisions of this act authorizing
19 the issuance and retirement of the bonds.

20 (b) The board shall fix the rates for water so that the
21 total forecast revenues for the district are equal to the
22 total forecast expenses. The rates, subject to this chapter,
23 shall be uniform for like classes of service throughout the
24 district.

25 SEC. 2. Section 134.3 is added to the Metropolitan
26 Water District Act (Chapter 209 of the Statutes of 1969),
27 to read:

28 134.3. (a) The Legislature finds and declares that:

29 (1) A district performs a necessary and vital public
30 service by developing, storing, and distributing water
31 and power.

32 (2) Broad powers have been granted to a district,
33 including the power to tax, set rates for service, and issue
34 debt, so that they may carry out their duties.

35 (3) It is not in the public interest for a district to
36 overtax their property owners or overcharge their
37 member agencies. These overcollections are best used by
38 the property owners or member districts as they see fit.

39 (4) It is not in the public interest for a district to retain
40 excessive reserves. Excessive reserves represent past

1 overcollections from property owners and member
2 agencies and should therefore be returned.

3 (b) The financial assets of a district shall be the
4 minimum necessary to maintain the debt rating selected
5 as prudent by the board. The board shall refund any
6 excess assets as soon as practicable in a fair and reasonable
7 manner, as determined by the board, to the district's
8 member agencies or taxpayers, or both.

9 ~~SEC. 2.~~

10 *SEC. 2.* No reimbursement is required by this act
11 pursuant to Section 6 of Article XIII B of the California
12 Constitution because the local agency or school district
13 has the authority to levy service charges, fees, or
14 assessments sufficient to pay for the program or level of
15 service mandated by this act. Notwithstanding Section
16 17580 of the Government Code, unless otherwise
17 specified in this act, the provisions of this act shall become
18 operative on the same date that the act takes effect
19 pursuant to the California Constitution.

O

APPENDIX B

References

APPENDIX B

References

1. Report. Executive Summary, Annual Budget, 1991-92 Fiscal Year. February 18, 1992.
2. Report. Agricultural Water Use in Metropolitan Water District of Southern California Service Area, Metropolitan Water District of Southern California Report #1018. October 1990.
3. Report. Regional Urban Water Management Plan for the Metropolitan Water District of Southern California. November 1990.
4. Report. Municipal & Industrial Water in Metropolitan Water District of Southern California Service Area. Interim Report #4. Summary Report by PMCL. June 1991.
5. Report. Municipal & Industrial Water in Metropolitan Water District of Southern California Service Area. Interim Report #4, PMCL. June 1991.
6. Report. \$3,000,000,000 The Metropolitan Water District of Southern California Water Rev. Bonds. Issue of 1991. New Issue (Full Book-Entry).
7. Report. Water Conservation Pricing Approaches of the Metropolitan Water District of Southern California, Metropolitan Water District of Southern California Staff Report. August 1991.
8. Report. Part 1 - Long Range Financial Plan. Preliminary Draft. December 1985.

Report. Part 2 - Financial Strategies and Policies for Meeting Metropolitan Water District of Southern California's Long-Range Capital Requirements. August 1988. Revised September 1988, November 1988.
9. Report. Part 3 - Revenue and Expenditures Forecasts (continued), (Part D, 1991-92 Budget). April 1991.

Part 4 - Projection of Construction Expenditures, (10 Years), June 1991, Master Schedule. February 1991.
10. Report. Distribution System Overview Study, Metropolitan Water District of Southern California. Report #971. October 1988.
11. Report. Annual Fiscal Report 1990-91.
12. Report. Capital Projects Program, 1991-1992 Fiscal Year. February 20, 1992.

13. Report. User Handbook of Seasonal Shortage Service, 1988-89. October 1989.
14. Report. The Metropolitan Water District of Southern California Act and Administrative Code.
15. Report. Metropolitan Water District of Southern California Minutes Special Budget Committee & Minutes Finance and Insurance Committee. October 3, 1991.
16. Report. Statistical Analysis of Water Demands During the Current Drought, Submitted to Metropolitan Water District of Southern California by Thomas Chesnutt & Casey McSpadden. January 1989.
17. Report. Drought Contingency Plan to Amend the Regional Urban Water Management Plan for the Metropolitan Water District of Southern California. February 28, 1992.
18. Report. Operation Division Annual Budget, 1991-92 Fiscal Year. March 11, 1992.
19. Report. Capital Projects Program, 1991-92 Fiscal Year. March 11, 1992.
20. Report. Manual for Preparing Budget Estimates and Requests, 1991-92 Fiscal Year. March 11, 1992.
21. Report. Recommendations for Certain Financial Strategic Steps by O'Brien Partners, Inc., February 19, 1991. March 11, 1992.
22. Report. Closing Documents, 1990 Revenue Bond Issue. March 11, 1992.
23. Report. Presentation to the Metropolitan Water District of Southern California Subcommittee on Financial Policies by O'Brien Partners Inc., March 12, 1992. March 16, 1992.
24. Memo. Determination of Total Revenues and Revenues to be Derived from Water Sales During Fiscal Year 1992-93. September 23, 1991.
25. Memo. Revised Determination of Total Revenue and Revenue to be Derived from Water Sales During Fiscal Year 1992-93. October 17, 1991.
26. Memo. Determination of Total Revenue and Revenue to be Derived from Water Sales and Taxes During Fiscal Year 1992-93. November 14, 1991.
27. Memo. Determination of Total Revenue and Revenue to be Derived from Water Sales and Taxes During Fiscal Year 1992-93. November 27, 1991.
28. Memo. Determination of Total Revenue and Revenue to be Derived from Water Sales and Taxes During Fiscal Year 1992-93. November 27, 1991.

29. Memo. Consequences of a Zero Rate Increase. December 13, 1991.
30. Memo. Assumptions Used to Reduce the Proposed 1992-93 Water Rate Increase from \$173 per Acre-Foot to \$47 per Acre-Foot. December 16, 1991.
31. Memo. Recommend Water Rates to Become Effective July 1, 1992. December 27, 1991.
32. Memo. Responses to Questions Raised at the Joint Meeting of the Special Budget, Financial and Insurance and Engineering and Operations Committees held on October 24, 1991. November 4, 1991.
33. Memo. Capital Improvement Program Deferral, November 5, 1991.
34. Memo. Special Meeting of October 24, 1991. October 8, 1991.
35. Memo. Financing Metropolitan Water District of Southern California's 1990's Construction Program (Metropolitan Water District of Southern California Report #971). December 13, 1988.
36. Memo. Incremental Interruption and Conservation Plan. November 20, 1990.
37. Memo. Resolutions of Intent to Impose a Water Standby Charge and/or an Availability of a Service Charge, Authority to Execute an Agreement for Consulting Services and Appropriation of Funds to Pay Expenses. January 23, 1992.
38. Memo. Mission Statement. November 26, 1991.
39. Memo. Certificates of Assessed Valuations for FY 1991-92 and Table of Member Agency Percentage Participation, Vote Entitlement and Director of Entitlement as of August 20, 1991. August 19, 1991.
40. Memo. Revenue Design Study. Jan 28, 1992.
41. Memo. Revised Incremental Interruption and Conservation Plan (IICP) Target Sheets. February 18, 1992.
42. Memo. Local Projects Program Financial Contribution. February 27, 1990.
43. Memo. Water Supply Update. February 28, 1992.
44. Memo. Interruptible Water Supply. February 21, 1992.
45. Memo. Recommended Water Rates to Become Effective July 1, 1992. December 27, 1991.
46. Memo. Readoption of Drought Contingency Plan Pursuant to Assembly

48. Memo. 1991-92 Annual Budget. November 26, 1990.
49. Memo. 1991-92 Annual Budget. February 14, 1991.
50. Memo. 1991-92 Personnel Budget. February 14, 1991.
51. Memo. 1991-92 Budget-Budget Analysis Team Report. February 14, 1991.
52. Memo. Review of Operating Equipment and Consulting Budgets. March 11, 1991.
53. Memo. Review of 1991-92 Budget. March 22, 1991.
54. Memo. Special Budget Committee Meeting Divisional Presentations. April 24, 1991.
55. Memo. 1992-93 Annual Budget. January 13, 1992.
56. Memo. Review of Table of Organizations and Consulting Budgets. February 3, 1992.
57. Memo. Status on Metropolitan's Local Projects Program. March 26, 1991.
58. Memo. Proposed Groundwater Recovery Program. March 26, 1991.
59. Memo. Proposed Conservation Credits Agreement with Calleguas Municipal Water District for an Ultra-Low-Flush Toilet Retrofit Program. August 6, 1991.
60. Memo. Financial Incentives for Water Conservation. August 8, 1988.
61. Letter. Transmittal of Graphics from Special Meeting of Engineering & Operations Committee. January 30, 1992.
62. Water Supply Conditions Forecasts and Summary Information. March 27, 1992.
63. Capital Improvement Program, January 1, 1992 through June 30, 1993.
64. Water Demands, Aqueduct Supplies, Water Production, Project Supplies, and Metropolitan Water District of Southern California Water Sales. Received from G. Chan February 18, 1992.
65. Local Projects Program Information Application Package.
66. Local Projects Program Financial Contribution. February 27, 1990.
67. Water Supply Conditions. Forecasts and Summary Information. Feb 19, 1992.

68. Assembly Bill No. 1875. March 8, 1991. An act to amend Sections 5470 and 5471 of, and to add Section 5471.5 to, Health and Safety Code, and to add Chapter 4 to Division 10 of Water Code, relating to water and sewage systems.
69. Water Supply Conditions Forecasts and Summary Information. February 27, 1992.
70. Mailer for support of the Domenigoni Reservoir, etc.
71. Would you pay \$5 to improve water reliability in Southern California? (One page advertisement).
72. Questions and Answers about the \$5 charge to improve Southern California's Water reliability.
73. Sample Resolution of Support for \$5 Charge to improve water reliability in Southern California.
74. Status of Key Groundwater Basins in Southern California. August 20, 1991.
75. Illustrative Marginal Cost Based Rates for LADWP. February 20, 1992. Source: LA Blue Ribbon Committee on Water Rates.
76. Memorandum of Understanding Regarding Urban Water Conservation in California. September 1991. Subject: Urban Water Conservation Best Management Practices. June 10, 1991.
77. Lotus Spreadsheets Annual Connection Charge Revenue at \$1,000/EDU, escalated 5% per year. November 20, 1991. (CNNCHRG3.WK3). Annual Connections (Based on Projected Housing Units and Commercial and Industrial Establishments). March 16, 1992. (CONNSUM.WK3).
78. Lotus Symphony File J299E. Survey of Active Water Exchange Agreements, Storage Agreements and Reclamation Projects. Updated thru August 2, 1988.
79. Graph. Average Residential Water Rates for Select Cities.
80. Chart. Metropolitan Facility Age.
81. Chart. Major Fault Zones within the Greater Los Angeles Area.
82. Chart. What Price Water?
83. Chart. Major Aqueducts Serving Southern California.
84. Chart. Comparison of Southern California Reservoirs (Acre-Feet).
85. Chart. Five Point Program to Meet the Current Fiscal Challenge.
86. Chart. Components of every dollar to be spent in Fiscal Year 1992-93.

87. Chart. Monthly Water Bill (Average Household).
88. Chart. Average Supplies During Normal Period, 2010.
89. Chart. Groundwater Production Trends.
90. Chart. Construction Funds Available. February 29, 1992 (in Millions).
91. Chart. Projected Construction Funding July 1992 Bond Sale \$400-\$500M--Negotiated.
92. Chart. Capital Improvement Deferral Program.
93. Chart. Projected Construction Funding. July 1992 Bond Sale \$150M-Competitive.
94. Chart. Projected Construction Funding. October 1992 Commercial Paper \$150M.
95. Chart. Schedule for 1992 General Obligation Bond Election.
96. Flowchart. Procedure for Estimating Metropolitan Water District of Southern California Sales.
97. Memo. Financing Metropolitan Water District's 1990's Construction Program (MWD Report #971) - Retrospective Demand Charges from Las Virgenes Municipal Water District. December 13, 1988.
98. Draft. Los Angeles Water & Power "Water Offsets" Program.
99. Memo. Proposed Parcel Charge from Las Virgenes Municipal Water District. Attachment - Update to December 13, 1988 Financing Metropolitan Water District's 1990's Construction Program (MWD Report #971). May 11, 1992.
100. Memo. Proposed Groundwater Recovery. March 26, 1991.
101. Memo. Report on Requirements and Budget Cycle. December 6, 1988.

APPENDIX C

**Summary of Responses
Water Revenue Questionnaire**

APPENDIX C

SUMMARY OF RESPONSES
WATER REVENUE QUESTIONNAIRE

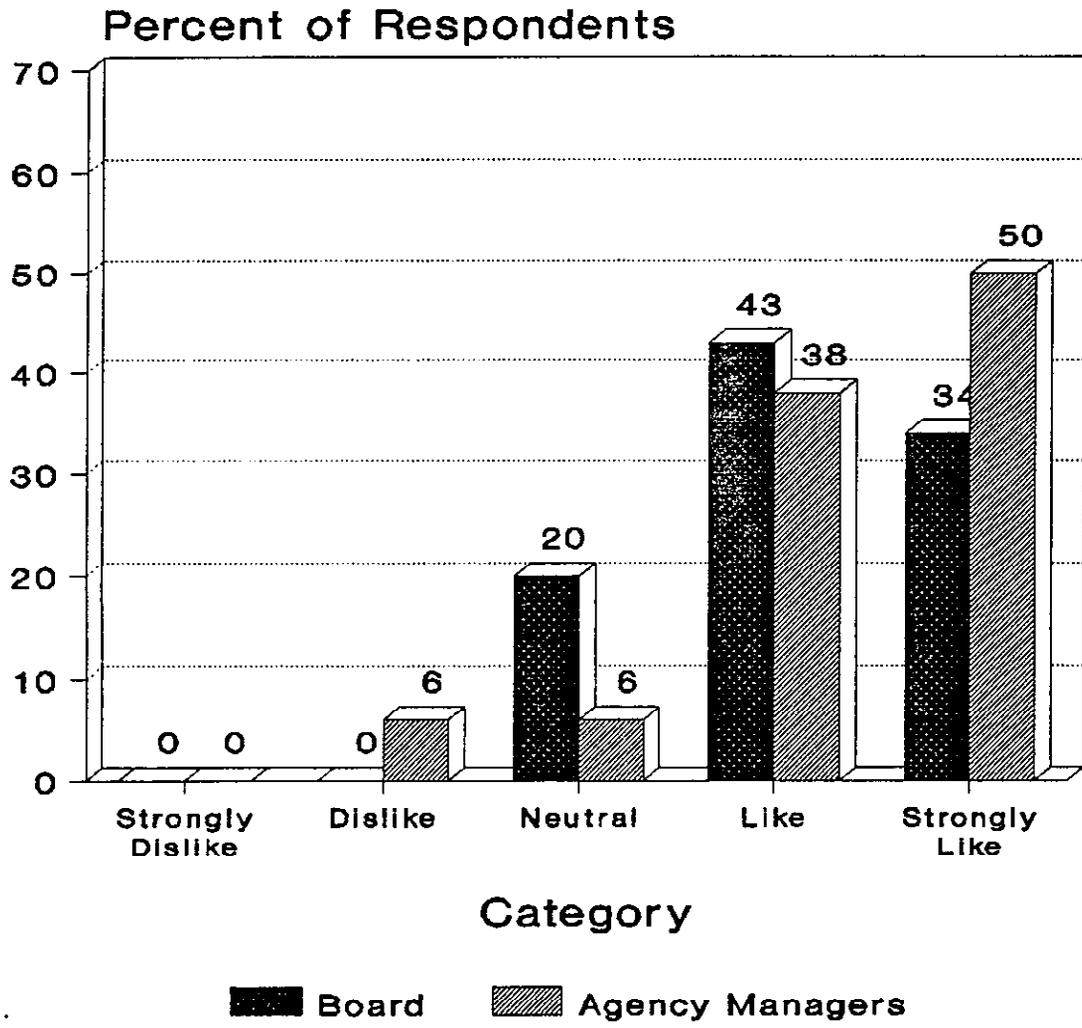
A water revenue questionnaire consisting of ten questions was sent to each of the 51 members of the Board of Director and the 27 Member Agency managers. Responses were received from 35 Board of Director members and 18 Member Agency managers. This section includes a listing of the questions along with the responses separated into those of the Board of Director members and those of the Member Agency managers. The percent of respondents summarized below does not total 100 percent for every question because not all Board members and Agency managers answered every question.

- 1) Considering the current mix of District revenue sources, would you like to see more or less emphasis placed on collecting revenue from the following sources, or do you feel that the emphasis is about right?

Board of Director members and Member Agency managers responded as follows:

	<u>Percent of Respondents</u>	
	<u>Board of Director Members</u>	<u>Member Agency Managers</u>
a) Water Rates		
▶ More Emphasis	34%	33%
▶ About Right	40%	39%
▶ Less Emphasis	23%	28%
b) Annexation Fees		
▶ More Emphasis	74%	67%
▶ About Right	20%	28%
▶ Less Emphasis	0%	5%
c) Taxes		
▶ More Emphasis	32%	39%
▶ About Right	17%	28%
▶ Less Emphasis	40%	28%

2) How do you feel about charges being levied on new development?



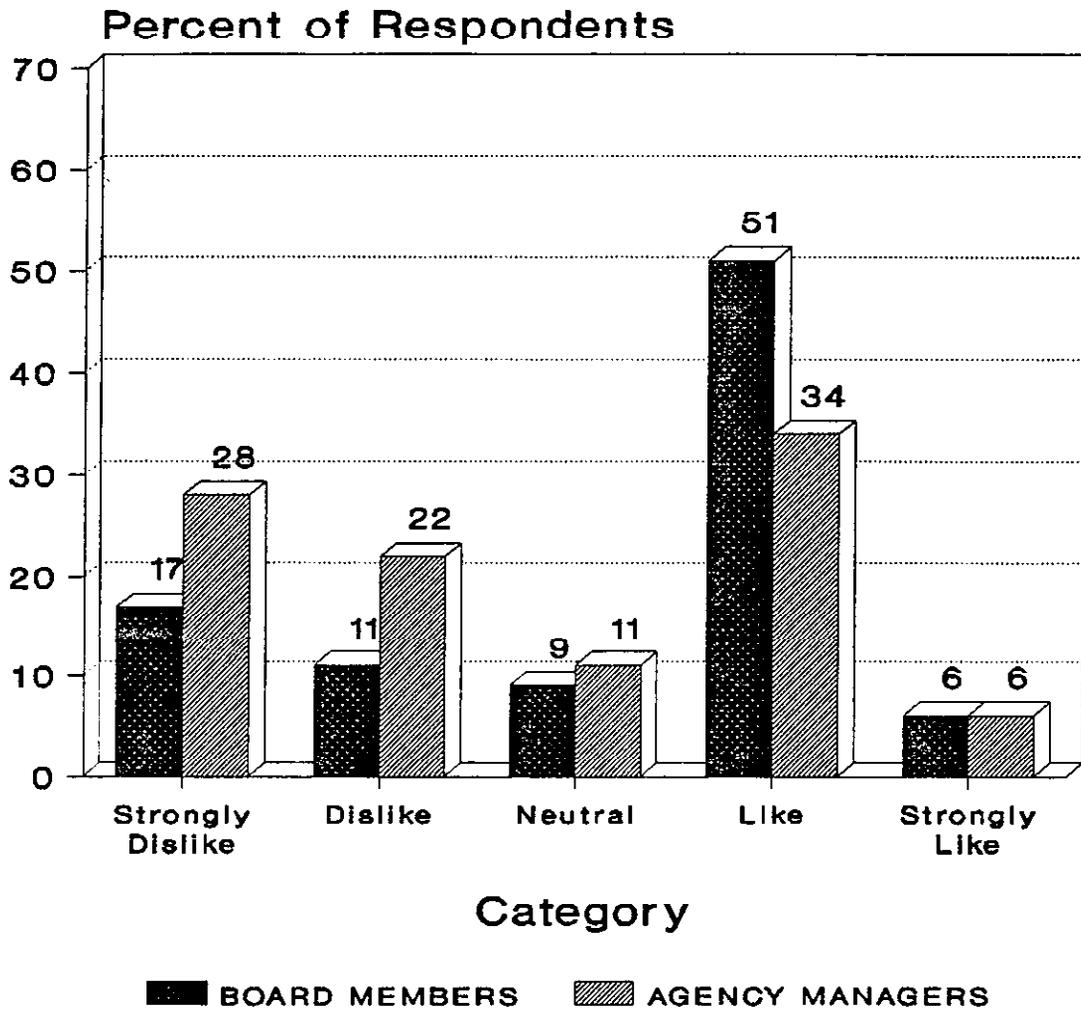
- 3) The district currently has, or has had, a variety of credits, rebates, or incentives programs. How do you feel about credits, rebates, or incentives for the following?

Board of Director members and Member Agency managers responded as follows:

	<u>Percent of Respondents</u>	
	<u>Board of Director Members</u>	<u>Member Agency Managers</u>
a) Agriculture Water		
▶ Strongly Dislike	14%	17%
▶ Dislike	34%	28%
▶ Neutral	34%	33%
▶ Like	12%	11%
▶ Strongly Like	0%	6%
b) Seasonal Storage		
▶ Strongly Dislike	0%	0%
▶ Dislike	14%	0%
▶ Neutral	12%	6%
▶ Like	34%	33%
▶ Strongly Like	37%	61%
c) Groundwater Treatment		
▶ Strongly Dislike	0%	0%
▶ Dislike	6%	0%
▶ Neutral	17%	0%
▶ Like	48%	50%
▶ Strongly Like	26%	44%
d) Reclaimed Water		
▶ Strongly Dislike	0%	0%
▶ Dislike	3%	0%
▶ Neutral	3%	0%
▶ Like	40%	28%
▶ Strongly Like	51%	67%
e) Conservation Credit		
▶ Strongly Dislike	9%	0%
▶ Dislike	14%	0%
▶ Neutral	9%	11%
▶ Like	51%	56%
▶ Strongly Like	11	28%
f) Incentives in General		
▶ Strongly Dislike	3%	5%
▶ Dislike	9%	0%
▶ Neutral	17%	17%
▶ Like	54%	50%
▶ Strongly Like	9%	28%

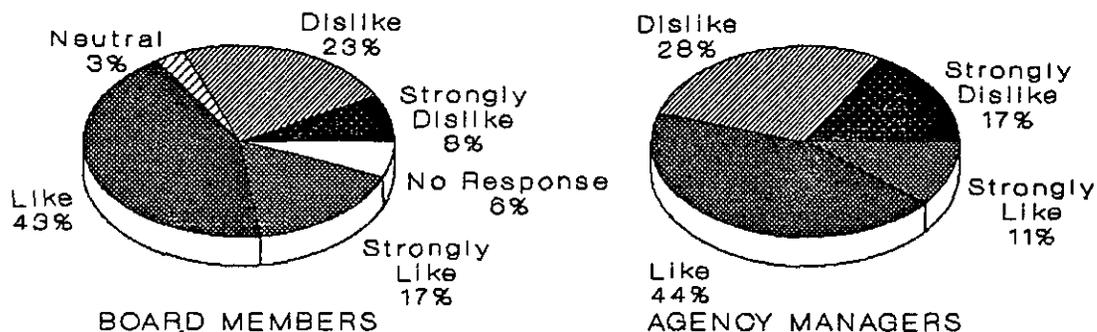
4) A method of raising revenue is an availability of service charge. Such a method involves a fixed charge to each member agency. How do you feel about such a revenue source being utilized?

Board of Director members and Member Agency managers responded as follows:



- 5) Another method of raising revenue is the use of standby or parcel charges. Such charges apply to each property owner, including undeveloped property. How would you feel about such a revenue source being utilized?

Board of Director members and Member Agency managers responded as follows:



- 6) Charges on new development have many different names such as Connection Charges, Impact Fees, System Capacity Charges, etc. How do you feel about such charges being used to recover capital costs related to providing the following types of new facilities?

Board of Director members and Member Agency managers responded as follows:

	Percent of Respondents	
	Board of Director Members	Member Agency Managers
a) Water Acquisition		
▶ Strongly Dislike	3%	6%
▶ Dislike	3%	6%
▶ Neutral	6%	11%
▶ Like	51%	33%
▶ Strongly Like	34%	44%
b) Storage Reservoirs		
▶ Strongly Dislike	0%	6%
▶ Dislike	3%	6%
▶ Neutral	9%	0%
▶ Like	48%	50%
▶ Strongly Like	37%	38%

- c) Water Transmission
- | | | |
|--------------------|-----|-----|
| ▶ Strongly Dislike | 0% | 11% |
| ▶ Dislike | 0% | 6% |
| ▶ Neutral | 12% | 0% |
| ▶ Like | 51% | 44% |
| ▶ Strongly Like | 34% | 39% |
- d) Water Treatment
- | | | |
|--------------------|-----|-----|
| ▶ Strongly Dislike | 3% | 11% |
| ▶ Dislike | 0% | 6% |
| ▶ Neutral | 9% | 0% |
| ▶ Like | 57% | 50% |
| ▶ Strongly Like | 28% | 33% |

7) If you were rating the alternatives in Questions 4 through 6, which of the following criteria is most important to you? Please rank these criteria with 1 for the most important, through to 7 for the least important criteria.

- ▶ Potential for fee or charge to be legally challenged.
- ▶ Equity (whether the fee or charge would be equitable to all member agencies).
- ▶ Consistency with District policy.
- ▶ District ease of administration.
- ▶ How easy the fee or charge would be to implement for your agency.
- ▶ How stable the revenue would be.
- ▶ Conservation impact (whether the fee or charge would help or hinder conservation efforts).

The weighted average of the rankings of the Board of Director members and Member Agency managers are listed below in order of most important to least important:

Board of Director Members	Member Agency Managers
Agency Equity	Agency Equity
Revenue Stability	Ease of Implementation
Conservation Impact	Revenue Stability
Ease of Implementation	Conservation Impact
Consistent with District Policy	Ease of Administration
Ease of Administration	Consistent with District Policy
Legal Challenge	Legal Challenge

- 8) Water rates can take many different forms and have different components. Do you feel that the following may, or may not, be applicable for the District?

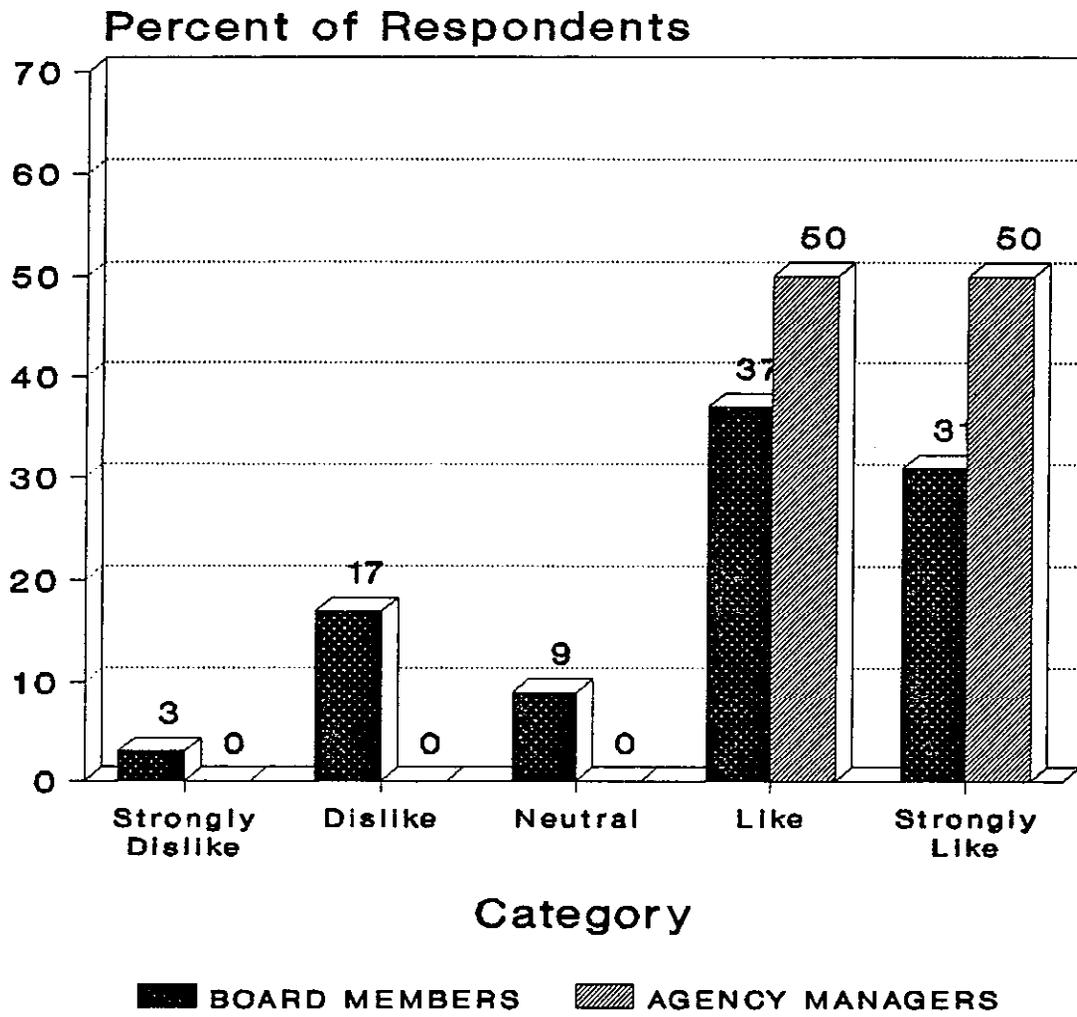
Board of Director members and Member Agency managers responded as follows:

	<u>Percent of Respondents</u>	
	<u>Board of Director Members</u>	<u>Member Agency Managers</u>
a) Volume Charge		
▶ May be applicable	80%	94%
▶ May not be applicable	17%	6%
b) Service Charge		
▶ May be applicable	80%	67%
▶ May not be applicable	17%	33%
c) Tiered Rates		
▶ May be applicable	52%	50%
▶ May not be applicable	45%	50%
d) Demand Rates		
▶ May be applicable	65%	61%
▶ May not be applicable	32%	39%
e) Lifeline Rates		
▶ May be applicable	34%	27%
▶ May not be applicable	63%	73%

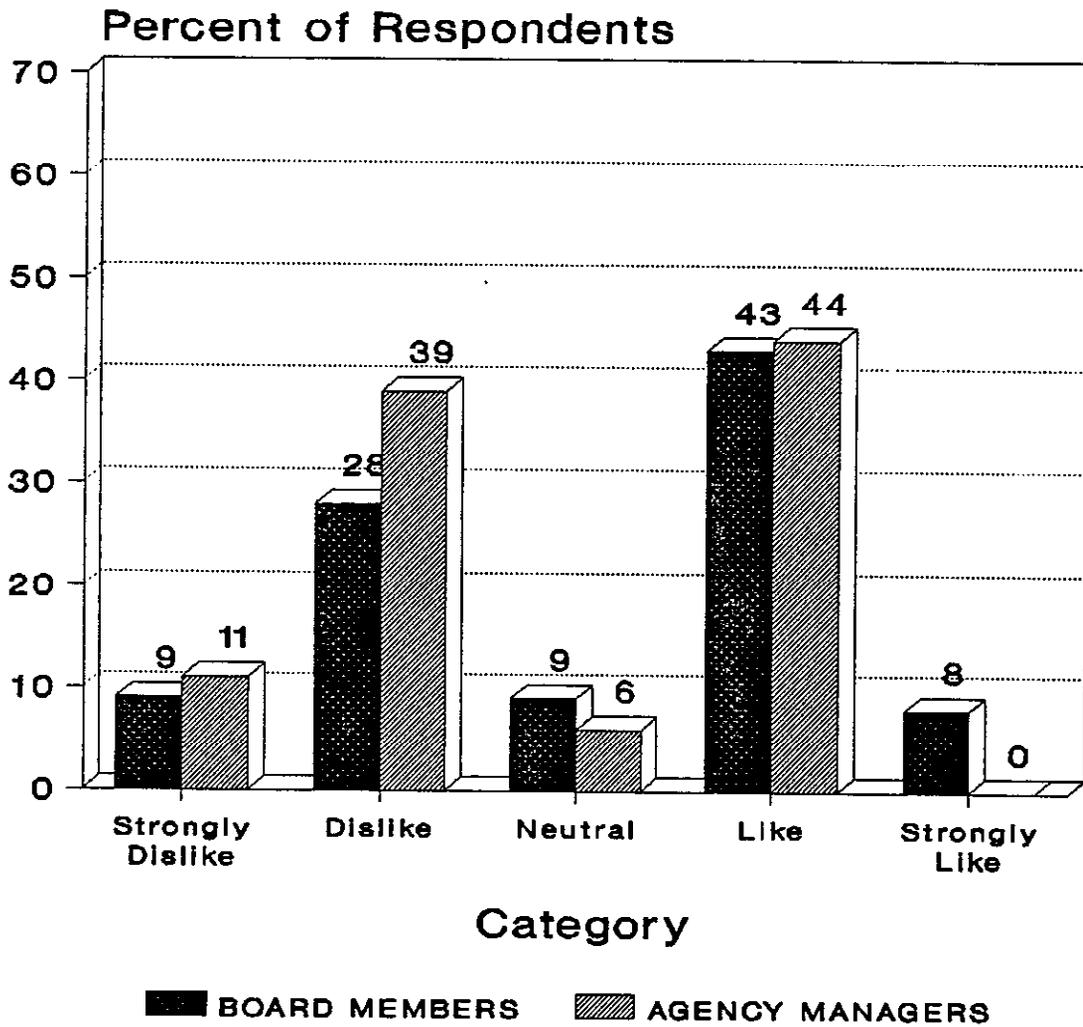
- 9) How do you feel about each of the above rate forms which you think may be applicable for the District?

Board of Director members and Member Agency managers responded as follows:

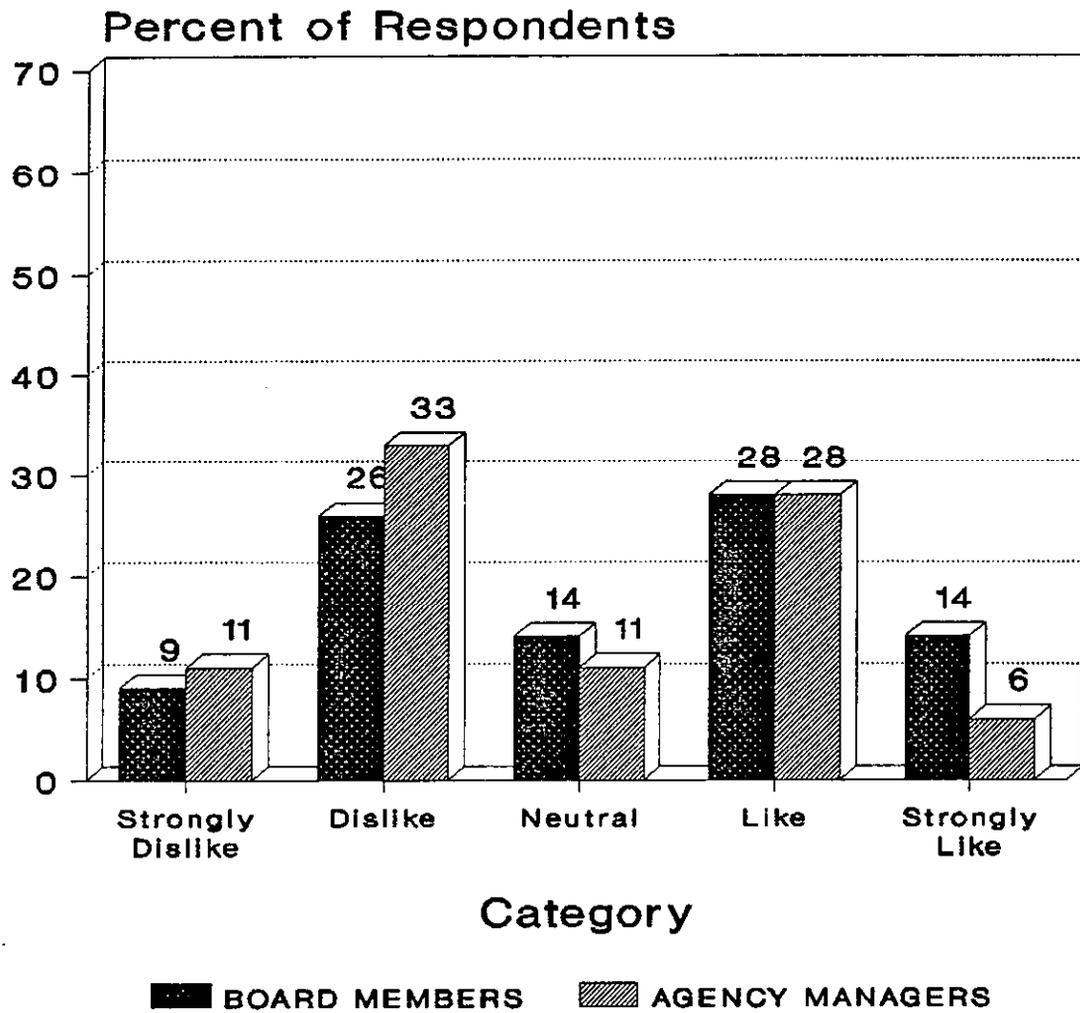
a) Volume Charge



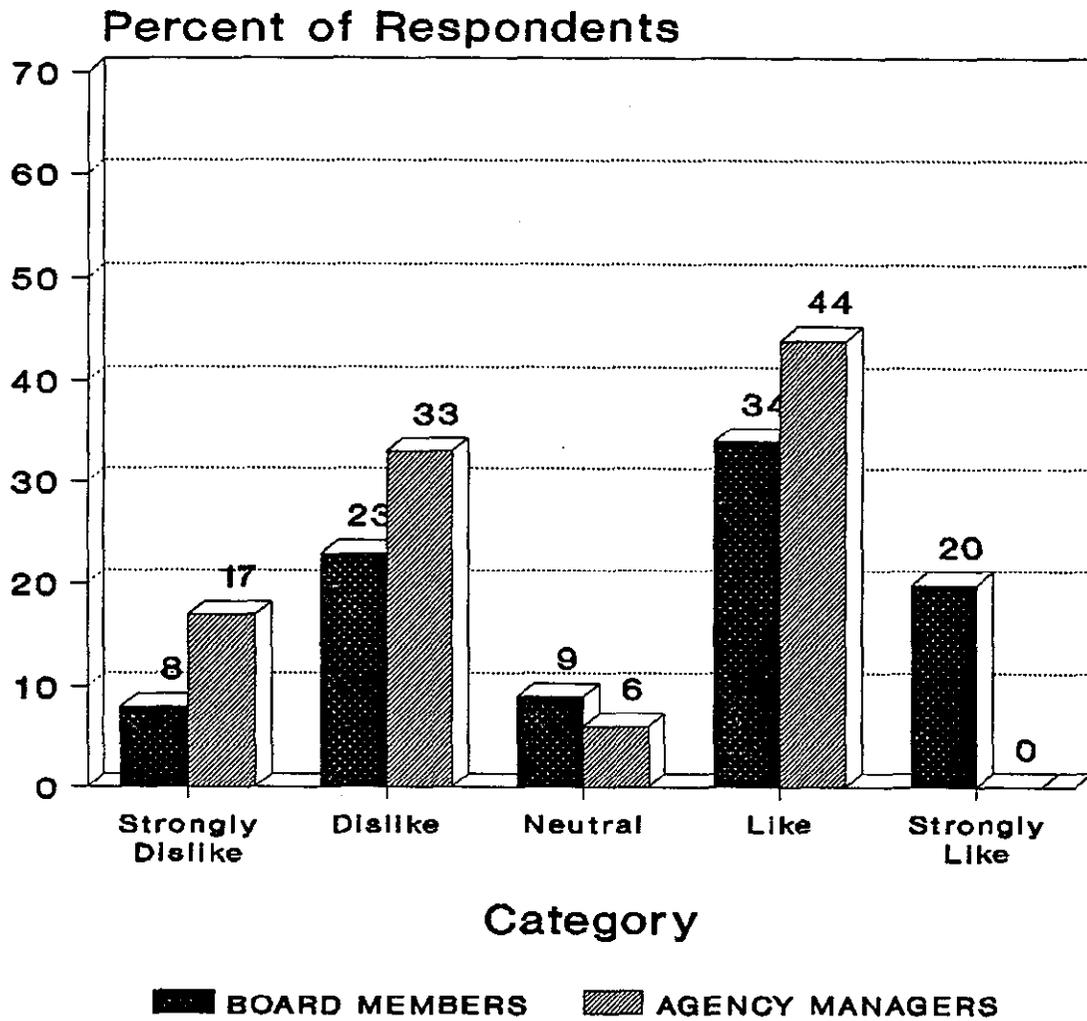
b) Service Charge



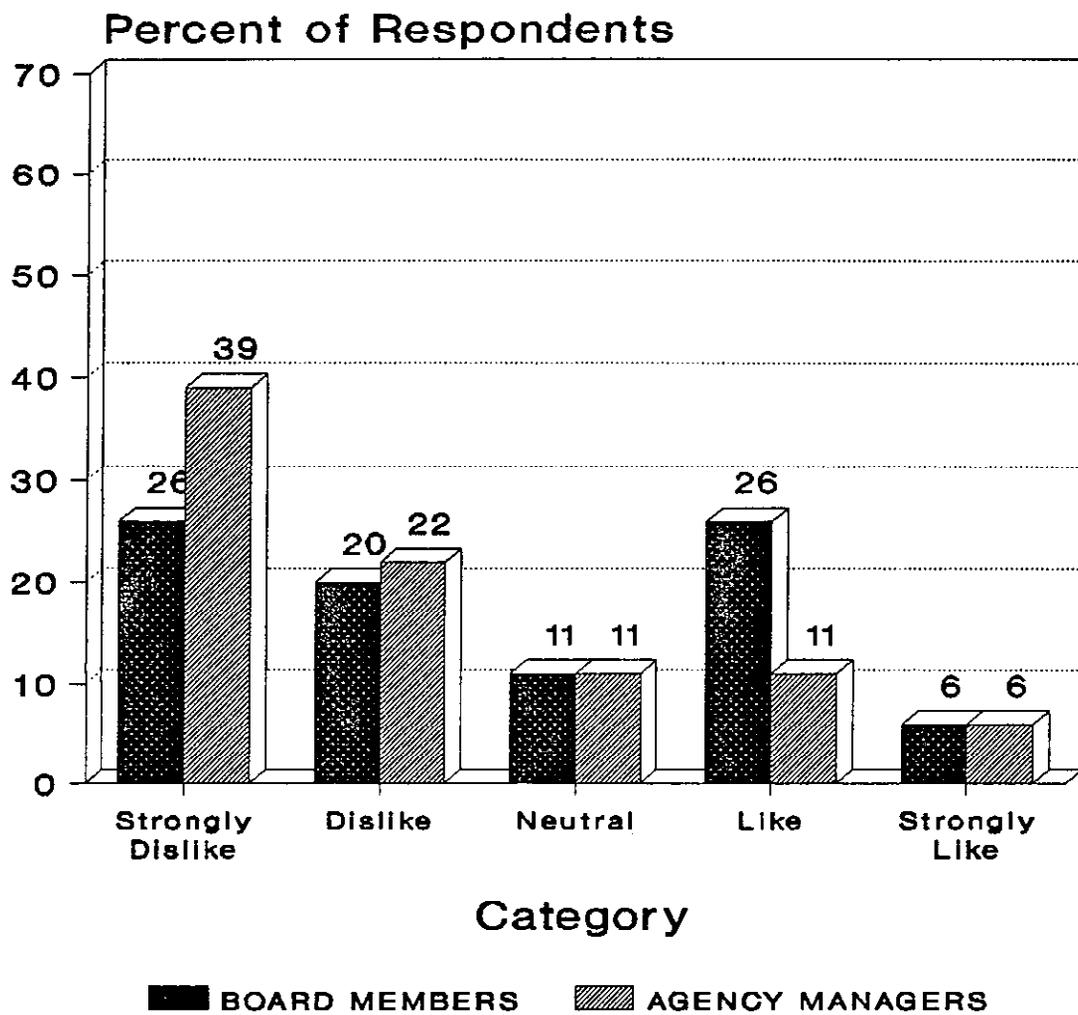
c) Tiered Rates



d) Demand Rates



e) Lifeline Rates



10) If you were rating the alternatives in Question 9, which of the following criteria is most important to you? Please rank these criteria with 1 for the most important, through 7 for the least important criteria.

- ▶ Potential for fee or charge to be legally challenged.
- ▶ Equity (whether the fee or charge would be equitable to all member agencies).
- ▶ Consistency with District policy.
- ▶ District ease of administration.
- ▶ How easy the fee or charge would be to implement for your agency.
- ▶ How stable the revenue would be.
- ▶ Conservation impact (whether the fee or charge would help or hinder conservation efforts).

The weighted average of the rankings of the Board of Director members and Member Agency managers are listed below in order of most important to least important:

Board of Director Members	Member Agency Managers
Agency Equity	Agency Equity
Revenue Stability	Ease of Implementation
Conservation Impact	Revenue Stability
Ease of Implementation	Conservation Impact
Consistent with District Policy	Ease of Administration
Ease of Administration	Legal Challenge
Legal Challenge	Consistent with District Policy