Developing Rates for Small Systems

MANUAL OF WATER SUPPLY PRACTICES

M54

First Edition

American Water Works Association

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Developing Rates for Small Systems

AWWA MANUAL M54

First Edition

American Water Works Association

Science and Technology

AWWA unites the drinking water community by developing and distributing authoritative scientific and technological knowledge. Through its members, AWWA develops industry standards for products and processes that advance public health and safety. AWWA also provides quality improvement programs for water and wastewater utilities.

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Introduction

In 2000, the American Water Works Association (AWWA) published the fifth edition of AWWA Manual M1, *Principles of Water Rates, Fees, and Charges*. That manual provides comprehensive and detailed guidance regarding the establishment of rates and charges for water service. The methods and examples contained in Manual M1, while recommended and appropriate for many water utilities, may prove to be overly complex and burdensome for others. This burden applies particularly to the development of cost-of-service rates. Such rates require the determination of revenue requirements by customer class before designing and adopting a rate structure.

Recognizing the limitations Manual M1 may have for smaller systems, or larger systems without sufficient data or rate-making capability, the AWWA Rates and Charges Committee (authors of Manual M1) developed the idea for a "Manual M1-type" alternative. A rate manual for small systems would provide guidelines for the development of rates for utilities that lack the data and resources needed to apply the methods described in Manual M1. For these utilities, this manual—*Developing Rates for Small Systems*—provides guidance in developing rates when data and information may be lacking. The Rates and Charges Committee encourages all utilities to use Manual M1 as the primary guidance tool but believes this new manual fills a need for small systems.

This manual is intended to serve as a resource for managers (and others) of small water systems in the determination of rates for water service. Recognizing that small systems may be faced with resource and data limitations, this manual can be used as a guide in the development of financial plans, revenue requirements, rate analyses, and rate design. Other resources, e.g., Manual M1 and state and local government agencies, may also be of value in the preparation of rates for small systems. However, this manual focuses on the unique attributes of small systems as related to financial planning and rate design. Managers and operators of small systems and their advisors (financial, accounting, and engineering professionals) should find this manual useful in preparing water rates that recover costs using generally accepted cost-based practices.

AWWA does not specifically define a small system. Water systems are often characterized based on the population they serve. According to the US Environmental Protection Agency (Safe Drinking Water Information System, accessible at www.epa.gov/OGWDW/databases.html), there are approximately 55,000 community water systems (CWSs) serving 264 million people in the United States. Eighty-five percent of the CWSs are very small to small systems that serve 10% of the population. CWSs are classified based on the population ranges noted below:

25–500 people	Very small
501–3,300	Small
3,301–10,000	Medium
10,001–100,00	Large
>100,000	Very large

In general, this manual is written for water utility systems serving a population of less than 10,000. While there may be systems larger than this that can benefit from the guidance provided in this manual, it is anticipated that larger systems would have resources or access to resources that would result in water rate analyses more consistent with those discussed in Manual M1.

For purposes of this manual and those who might benefit from its use, there is no reason to specifically define a small system in terms of connections or population. Rather than define a small system in either of these terms, and therefore restrict or limit the applicability of this manual, the characteristics of the systems to which this manual may apply are the primary consideration. For example, such factors include

- a lack of or limited customer or demand data;
- a system that predominately serves only a single class of customers, e.g., residential accounts;
- limited system peak-day and peak-hour data; and
- limited or nonexistent fixed asset data.

Regardless of size, water systems with these and other similar characteristics will likely benefit from this manual. So while this manual is generally written for systems serving a limited population, any system having one or more of the characteristics listed above may also find it useful.

At the same time, this manual may not be applicable for many water systems. Systems with a rapidly growing or diverse customer base, those with a large industrial customer or customer base with significant outside city or wholesale service arrangements, or those with contracts requiring cost-of-service–based rates should refer to Manual M1 for guidance in financial planning, cost allocation methods, and rate design. Systems seeking to materially modify their rate design approach would also benefit from the information contained in Manual M1.

This manual contains five chapters and an appendix:

- *Chapter 1: Customer Account and Usage Data*—discusses the importance and use of system and customer account and usage data in the rate-setting process and begins a case study that presents this type of data for an example small utility.
- *Chapter 2: Preparing a Financial Plan*—discusses the types of costs often encountered in a small water utility, the establishment of reserves, and the process of developing a projection of costs and the compilation of a cash flow statement for use in projecting the need for future revenue adjustments. Continuing the case study, this chapter calculates revenues from current rates based on the customer and usage data contained in the previous chapter.
- *Chapter 3: Determining a Pattern of Revenue Increases and Test-Year Revenue Requirements*—discusses the process of determining revenue requirements and presents alternatives (as part of the case study) for increasing revenues, with consideration given to the use of reserves and the impact on customers.
- *Chapter 4: Rate Design*—discusses considerations and alternatives in the design of rates and illustrates a rate-design option based on the case study developed in the previous chapters.
- *Chapter 5: Special Considerations*—presents and discusses a variety of issues associated with the rate-design process, including public involvement, the

regulatory process for approval of rates (for investor-owned and some government-owned utilities), system development charges, and rates by customer class.

- *Appendix A: Alternative Cash Flow Plans*—presents complete alternative cash flow plans.

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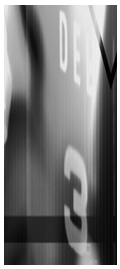

Chapter 1

Customer Account and Usage Data

INTRODUCTION

Appropriate water rate setting should embrace the concepts of fairness, equity, and cost causation. These concepts are applicable to both the utility's customers and to the utility itself. First, water rates should be structured so that each class of customer and, to the extent practicable, the individual customers within each class are paying their appropriate share of the cost incurred by the utility in providing service to those customers or classes. Also, the utility should try to avoid situations in which one customer or customer class is unnecessarily subsidizing another. In accomplishing these rate-setting objectives, it is necessary to ensure that the rates are based on accurate customer information and data.

Second, the total revenue that is collected by the water utility should be reflective of the cost of operating the utility. To meet this objective, a utility should only collect revenues sufficient to meet its revenue requirements and satisfy its bond covenants and other legal or self-imposed financial performance measures. In addition, stable rate revenue over the long run enhances a utility's overall financial integrity.

For the water utility to successfully meet these goals when setting water rates, it must have a good foundation of customer account and water usage data on which to establish those rates. At a minimum, in order to promote fairness and equity in the rates, the utility must know the number of customers being served and the amount of water being consumed within a given year or billing cycle. The utility must also know the overall revenue requirements to effectively operate the water utility (see chapter 2). Additional customer information may serve to improve the utility's ability to enhance the fairness and equity of its rates and charges, e.g., water use by class and meter size.

This chapter discusses a utility's customer base, the specific customer information a water utility should consider in order to calculate water rates and charges, and how that information should be applied. This chapter also introduces the example utility that will serve as the case study throughout this manual.

CUSTOMER INFORMATION

Accurate customer data are critical for establishing supportable water rates that are fair and equitable to customers and that will generate sufficient revenue for the utility. Further, good records are necessary to adequately assess the impact of alternative rate structures on issues such as revenue sufficiency and stability, individual customer or customer class equitability, and conservation goals and objectives. By far the most significant source of revenue for most water utilities is that produced from water sales. The application of a well-designed rate structure to the number of bills and/or metered water usage produces the revenues needed to sustain the utility's financial well-being.

The primary source of customer information is the utility's customer billing system. Much of the information that is necessary to produce a utility bill is the same information that is required to establish water rates. The development of a rate structure can be hampered by inaccurate customer billing records, resulting in rates that do not generate sufficient revenue to meet the utility's revenue requirement, satisfy its bond covenants, and provide fair and equitable charges to its customers. In the absence of adequate or accurate customer records, the utility should make an investment to improve its customer information before moving forward with a comprehensive rate review. Prior to such an investment, however, the utility should attempt to identify various shortfalls and problems with their existing customer records. Possible short-term improvements could include a customer profile survey, the re-creation of records, or verification of information and other methods, dependent on the particular shortfalls in the utility's customer database.

It is also critical to understand the limitations of the existing billing system in implementing alternative rate structures. Rate structures that require information that is not currently maintained in the existing database or that cannot be entered economically or efficiently should not be considered unless plans exist to modify the billing system.

As previously stated, it is likely that much of the information necessary to calculate water rates is contained and available within the utility's billing system. However, accessing that data in a timely and cost-effective fashion may not be possible. It is important that, as part of the rate-study process, ample time is allowed for the identification, extraction, compilation, and review of the customer data from the electronic database. There may be technical challenges in each step of this process that slow access to this information. These technical issues should be identified and corrected if possible. Once retrieved from the database, this information should be reviewed and audited for accuracy and reasonableness. This data will be the foundation of the utility's water rates, and errors in the data could result in inappropriate rates or in the utility collecting too little or too much revenue.

IMPORTANCE OF CUSTOMER RECORDS

For the purposes of water rate setting, accurate and detailed customer records are important in the areas of (1) number of customers, (2) metered consumption, (3) billed revenue data, (4) peak period demand data, and (5) information on public and private fire services. For some utilities, not all of this information is readily accessible or even available. The example illustrated in the balance of this manual is based on the following data:

- Number of customers
- Metered consumption
- Billed revenue

Number of Customers

As a starting point, most utilities maintain certain standard customer-related statistics. This information typically includes a listing of water utility customers and their billing addresses. Along with this information, most utilities will have details related to the size of each customer's meter and, if multiple rate classes are used, the class for each customer. This type of information is often referred to as "tombstone" information because it does not generally change between billing periods but rather forms the basis of the customer record. Along with the tombstone information are other data that generally are updated for each billing period. This includes metered consumption data, payment history, and service call history. Data for past billing periods may be available on a monthly/quarterly/semiannually or aggregated year-end basis, depending on the sophistication of the utility billing system and the frequency of billing.

A utility should maintain records regarding the number of water bills it has issued in terms of meter size and customer class. This detailed information is necessary to accurately develop customer-related charges such as a minimum charge (which may include some water usage allowance) or service charge (billing or meter units that do not include a water usage allowance). These base or fixed charges are common to almost every type of alternative rate form and may be significant in terms of providing the water utility a stable source of revenue.

Table 1-1 shows an example tabulation of the number of metered accounts by meter size and by customer class, as well as the number of unmetered accounts by class. As discussed below, this information can represent a year-end accounting, annual average, monthly average, or other billing period. The basis of reporting should be clearly specified in the database so the reporting period is clear to the user.

Within any given water utility, it is common to bill all customers on the same frequency, although billing frequencies may vary by classification of customer. For example, residential accounts may be billed quarterly while other accounts are billed monthly. This may be done for a variety of reasons, but the result is that there may not be a one-to-one correspondence between the number of customers within a class and the number of water bills generated. For the example illustrated in this manual, all customers are billed monthly. In Table 1-2 all customers (see Table 1-1) are assumed to have been active and receiving service for each month of the year; as such, the number of accounts multiplied by 12 yields the number of bills shown in Table 1-2. In reality this is rarely the case because customers open and close accounts as they move in and out of a community.

Calculating number of customers. The number of customers can be calculated in a variety of ways, depending on the amount of detail available. It is most common to assume that the number of customers is equal to the number of metered and unmetered services.

End of year. The end-of-year customer count may be used to determine the number of customers. An advantage with this count is that it reflects the net number of accounts added throughout the year and, in the absence of a known change in the customer base, forms a reasonable basis for projecting accounts for the coming years. For a smaller utility that does not experience significant turnover in accounts, this method may be adequate for projecting the number of future customers for rate-setting purposes. In a steadily growing system, if the end-of-year values are used to estimate revenues for the year in question, these values may overstate the revenue.

Table 1-1 Number of customers by meter size

	Residential	Nonresidential	Total
Unmetered Accounts	200	40	240
Metered Accounts			
5/8 in. and 3/4 in.	1,900	80	1,980
1 in.	—	15	15
1 1/2 in.	—	5	5
2 in.	—	4	4
3 in.	—	3	3
4 in.	—	2	2
6 in.	—	1	1
Total metered accounts	1,900	110	2,010
Total all accounts	2,100	150	2,250

Table 1-2 Number of annual water bills sent to customers by meter size

	Residential	Nonresidential	Total
Unmetered Accounts	2,400	480	2,880
Metered Accounts			
5/8 in. and 3/4 in.	22,800	960	23,760
1 in.	—	180	180
1 1/2 in.	—	60	60
2 in.	—	48	48
3 in.	—	36	36
4 in.	—	24	24
6 in.	—	12	12
Total metered accounts	22,800	1,320	24,120
Total all accounts	25,200	1,800	27,000

Annual average. The annual-average customer count is the average of the customer count from the beginning of the year and the end of the year and, as such, corresponds more closely with the costs incurred to produce water for that same period of time. However, it has the disadvantage of understating the customer count in a growing utility and overstating the customer count in a utility with a decreasing customer base. The practical risk is that if the average is used for rate setting, the actual revenues received by the utility may not be the same as the forecasted revenues. Care should also be taken if this approach is used by a utility with significant seasonal variations in the number of accounts, i.e., resort and "second home" communities.

Monthly average. The monthly-average customer count is calculated by taking the arithmetic average of the 12-month end-customer counts to produce the average number of customers per year. This can be a more accurate figure than either the end-of-year or annual-average values because it captures the month-to-month changes in customers that can occur. This approach will produce a more accurate per-customer cost, but it also shares the risk of misstating forecasted revenues if the annual average is quite different from the year-end customer count balance. If the utility has a significant seasonal population, this approach may be more accurate.

Metered Consumption

In order to design and evaluate alternative rate structures and to determine those that best meet the utility's goals, it is important to have detailed customer consumption records. Available information may be limited to metered volume by customer account for utilities that do not have multiple customer classes or use tiered rates (rates with two or more unit volume rates and associated usage blocks or steps) and/or seasonal rates. At a minimum, individual customer data should be maintained on an annual basis, but preferably it should be maintained on a billing cycle basis (monthly, bimonthly, quarterly, etc.) for at least one full year.

Metered consumption is of particular importance in areas where weather can vary significantly from year to year, water usage is sensitive to weather patterns, and the utility currently has or is considering a rate structure that reflects this variability of demand. For example, in regions where discretionary uses such as lawn irrigation constitute a large proportion of annual or at least seasonal water sales, the utility may want to institute a water conservation rate structure to encourage efficient use of the system and resource. In such cases, water consumption by customer class by billing period is necessary to establish such a rate structure.

In the illustrative example developed for purposes of this manual, annual metered water consumption was assumed to be readily available only for total residential and total nonresidential customers (metered). Water consumption information was not available by meter size. To determine the consumption for accounts with meters larger than 3/4 in., the utility manually aggregated the water bills to calculate consumption on the 30 accounts that comprise the 1-in. to 6-in. meter customers. An estimate was used to determine the water use for the unmetered nonresidential accounts based on the known consumption of the total metered accounts. Similarly, the unmetered residential account usage was based on the average usage per account for the metered residential accounts. This information is summarized in Table 1-3.

If possible, this type of billing data (ideally on a monthly basis or the utility's billing frequency) should be maintained for a period of three to five years in order to provide the utility with a database that encompasses a wide range of potential weather conditions and related water usage and demands on the system. The availability of this type of data enables the water utility to "test" various alternative rate structures against a variety of weather conditions. This information further allows for the analyses and establishment of necessary reserves or working capital balances that should be maintained to enhance the revenue stability of the utility during periods of lower-than-normal water usage caused by weather conditions or other events.

Table 1-3 Water use by meter size (1,000 gal)

	Residential	Nonresidential	Total
Unmetered Accounts	25,300	16,400	41,700
Metered Accounts			
5/8 in. and 3/4 in.	240,000	7,500	247,500
1 in.	—	3,520	3,520
1 1/2 in.	—	2,350	2,350
2 in.	—	3,000	3,000
3 in.	—	4,220	4,220
4 in.	—	7,510	7,510
6 in.	—	16,900	16,900
Total metered accounts	240,000	45,000	285,000
Total all accounts	265,300	61,400	326,700

Table 1-4 Current rates

Unmetered Accounts	$25.00 per account per month
Metered Accounts	
Volume rate	$1.50 per 1,000 gal
Fixed charge	$12.50 per account per month

Another important reason to keep detailed records of metered consumption by class of customer and/or meter size on a billing period basis is to enable the development of a bill frequency distribution analysis, or bill tabulation analysis.* A bill tabulation analysis is particularly important in the development of declining block and inverted block rate structures or in the establishment of lifeline rates, where a different unit rate is assigned to metered consumption that falls in a predetermined consumption or rate block. In these rate forms, it is necessary to know the percentage distribution of the annual water use by class in each of the consumption or rate blocks. Without that knowledge, there is a risk that the calculated water rate will result in revenues that may be significantly different from the utility's revenue needs.

Billed Revenue

A third customer statistic that is important in the development of rates and that is maintained by most utilities is billed revenue. Most often this information is available by customer class and perhaps by meter size if the rate structure includes a charge that varies by meter size. This information is important for the utility to use as a benchmark when comparing actual billed revenue to the billed revenue anticipated from proposed new rates. In practice, this is done by applying existing rates to the customer account and consumption data to develop a "base" level of billings. The existing rates for the example utility are illustrated in Table 1-4 and are used to develop the revenues illustrated in Table 1-5.

*This analysis is described and illustrated in Manual M1, appendix C.

Table 1-5 Revenues by customer type and meter size

	Residential		Nonresidential		Total		
	Fixed	Variable	Fixed	Variable	Fixed	Variable	Com-bined
Unmetered Accounts	$60,000	$ —	$12,000	$ —	$72,000	$ —	$72,000
Metered Accounts							
5/8 in. and 3/4 in.	285,000	360,000	12,000	11,250	297,000	371,250	668,250
1 in.	—	—	2,250	5,280	2,250	5,280	7,530
1 1/2 in.	—	—	750	3,525	750	3,525	4,275
2 in.	—	—	600	4,500	600	4,500	5,100
3 in.	—	—	450	6,330	450	6,330	6,780
4 in.	—	—	300	11,265	300	11,265	11,565
6 in.	—	—	150	25,350	150	25,350	25,500
Total metered accounts	285,000	360,000	16,500	67,500	301,500	427,500	729,000
Total all accounts	$345,000	$360,000	$28,500	$67,500	$373,500	$427,500	$801,000

The base billings can then be compared with actual billings. This will allow the water utility a measure of the accuracy of the billing statistics or units of service with which it is working. This provides for a reasonable level of accuracy that the anticipated revenue will be achieved when the proposed rates are applied to these billing units. Table 1-5 shows an example of billings under existing rates based on the number of bills and metered consumption statistics developed in the previous tables. For the example utility, fixed revenues represent revenue from unmetered accounts and the fixed charge assessed all metered accounts. Variable revenues represent the volumetric or consumption portion of the customer's bill, i.e., the $1.50-per-1,000-gal rate applied to metered water use for the example utility. For the example, utility total revenues are calculated at $801,000 for the "base" year.

When a rate change is made, there are often increases in customer inquiries regarding their bills. To assist staff in responding to such customer calls, it is helpful if the utility's billing database contains readily accessible historical billing information by individual customer. It is also helpful to use this information to establish water use profiles so that customer impacts can be estimated based on changes in rates. These profiles are good tools to have available when addressing and explaining rate adjustments or a new rate structure in public forums.

CUSTOMER CLASSES

Rates should be developed so as to assign cost responsibility to each individual customer served by the utility in a way that reflects the cost incurred by the utility in serving each customer. Generally, it is neither economically practical nor often possible to determine the cost responsibility and applicable rates for each individual customer served by a utility. However, it is common to determine the cost of providing service for classes of customers that have similar water use characteristics and also for special customers that have unusual water use or service requirements. One objective of effective rate making is to assign costs to classes of customers in such a

manner that rates are equitable by approximating the cost of providing service to each customer class.

To achieve this objective, customers may be divided into classes that share common service characteristics and water use and demand patterns. An example of these characteristics can be found within the residential customer class. The residential customer class is made up primarily of single-family or dual-family dwellings. This group typically uses the smallest water meters, commonly 5/8 in. or 3/4 in. In many utilities, lawn irrigation in the summer months by the residential customer class places a significant peak-demand requirement on the system. These characteristics, prevalent across most residential users, provide the common thread for creation of a residential customer class for purposes of aggregating customer data and analyzing costs.

Comparatively, large-volume industrial customers, wholesale customers, and other large water users may not rely on the same extensive network of smaller distribution mains for water service; these customers typically rely on larger water meters to measure their flow requirements. When industrial customers use water in their manufacturing and production processes, they often use water at a fairly constant rate throughout the day, resulting in a lower peak-demand requirement on the system when compared to the residential class. This distinction illustrates the importance of considering rates by customer class and the need to maintain usage data by customer class.

In very broad terms, the following are common definitions of customer classes:

Residential: One- and two-family detached dwelling units.

Commercial: Multifamily apartment buildings and nonresidential, nonindustrial business enterprises.

Industrial: Manufacturing and processing business enterprises.

Wholesale: Master-metered customers that are generally located outside the jurisdictional limits of the water utility and that serve individual customers within their own service area.

As previously noted, one advantage of classifying customers into discrete classes or groupings is that it allows the utility to provide the starting point for considering different rates for each class of customer. This may be useful if the data exists to analyze the different demand characteristics and usage patterns of each class and, as appropriate, establish rates that maintain fairness among the different customer groups. Some utilities break down the four customer classes described above into more specific groups. For example, the commercial customer class may be separated into multifamily customers and commercial customers. Similarly, the industrial customer group may be subdivided into small industry, large industry, and special, the latter typified by a customer that is wholly unique to the utility and so significant that it is not reasonable to put that customer into a class with other customers. This could include a petroleum refinery, a pulp mill, or a power plant. Other classes may include consideration of different-sized commercial or municipal accounts.

For some utilities it may not be necessary to establish multiple classes of customers. Based on the principles of common service characteristics, water use and demand patterns, and jurisdictional limits, a small utility may identify only one, two, or perhaps three of these classes as being applicable to their particular circumstance. It is also less likely that a small utility serving a relatively homogeneous group of customers would develop specific groups within the classes. This would only occur if there were very unique and special circumstances for a particular customer or group of customers within that utility.

In some cases, data is not available to establish customer classes. In addition, there can be considerable variation in total use and demand characteristics within the traditional customer classes of residential, commercial, and industrial. For example, a bank with no public restrooms or lawn irrigation requirements will tend to have significantly lower consumption and different peaking patterns than a restaurant, yet both are typically classified as commercial. As an alternative, some utilities use meter size as a method to classify customers or to separate customers into subclasses.

In developing groupings of meter size for classification purposes, it is important to examine the total water use per customer in each class and, to the extent billing data is available, try to group customers that appear to have similar peaking characteristics. As an example, this later analysis can be approximated by looking at use per customer during peak-demand periods (e.g., the summer) and use during nonpeak periods. An example of such a customer classification may be small class: 5/8-in. and 3/4-in. meters, medium class: 1-in. to 2-in. meters, large class: 3-in. to 6-in. meters, and very large: larger than 6 in. For most smaller utilities, only two or three groupings should suffice.

WHOLESALE CUSTOMERS

Wholesale customers can generally be thought of as other water suppliers that are sold water through a master meter at one or more points of delivery for resale to individual retail customers within the wholesale customer's service area. Usually, a wholesale customer is a separate municipality or water district adjacent to the supplying utility. The utility that supplies water to the wholesale customer typically has no responsibility for distribution of the water within the wholesaler's system and is not responsible for individual customer metering, billing, or customer relations. The supplying utility typically sells treated water in bulk to another supplier. A utility providing wholesale service may benefit from the information and concepts discussed in Manual M1 with regard to the development of wholesale rates.

UNMETERED ACCOUNTS

For utilities that have customers with unmetered water service, it is difficult to develop water rates that fully recognize the principles of fairness and equity to such customers. This is because the unmetered customers' annual or monthly usage cannot be measured. Additionally, unmetered customers tend to use more water than metered customers because they typically pay a flat charge regardless of water use. Therefore, they do not perceive a price signal to reduce unnecessary water use. It is necessary to establish a separate class and rate for customers that have unmetered service. The utility may want to incorporate incentives in the water rates applicable to unmetered customers that would encourage such customers to change to a metered service, e.g., the water use levels assumed in developing the flat rate for unmetered customers are greater than the average use indicated for metered accounts or the utility may provide the meter and/or installation at no cost to the customers. Alternatively, the utility may establish a policy that requires all customers to be metered.

For the purposes of rate setting, it is necessary to establish some assumptions regarding the amount of usage and demand pattern for the unmetered customer. It is reasonable to make the simplifying assumption that customers who have unmetered services will use at least as much water as a customer with a metered service and that the unmetered customer's water usage characteristics are similar to the same type of customer with a metered service. This usage level can then be incorporated into the rate analysis for purposes of developing a flat or fixed charge per account per billing period.

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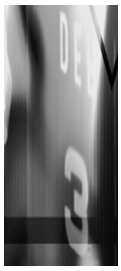

Chapter 2

Preparing a Financial Plan

OVERVIEW OF THE FINANCIAL PLANNING PROCESS

Development of a financial plan to reflect the annual cash requirements of the utility serves to identify its future operating and capital needs and to determine whether the projected revenue under existing rates will satisfy those needs. An integral financial plan can be developed by extending the current year's summary budget projection over a multiyear period.* The primary objective of this process is to ensure that the utility has the ability to obtain sufficient funds to develop, construct, operate, maintain, and manage its water system, on a continuing basis, in full compliance with federal, state, and local requirements. The financial plan is a critical tool in establishing creditworthiness and obtaining favorable interest rates for external capital financing in the credit markets.

The financial plan is used as the framework within which the interrelationship of revenues, reserves, operating costs, and capital costs are analyzed. A study period of 3 to 10 years is generally used. This allows a determination of whether existing rates are adequate to cover costs (now and in future years) and, if not, how much of an overall increase is needed. A properly constructed financial plan operates like a flow-of-funds projection, consolidating the various projections of revenues and expenses into one document or analysis.

This chapter discusses approaches and procedures for developing a financial plan along with what utility-specific information and documentation is needed to develop

*It is generally best to use summary budget data for projections. Line item detail data by programs, departments, or divisions does not typically lend itself to multiyear projections because of the volume of detailed data and the number of assumptions that would be required. Additionally, organizational requirements for specific programs are likely to change from year to year. That being said, any known changes in the utility's operations during the projection period (e.g., expansion of the water treatment plant) should be recognized in the financial plan projection.

a multiyear plan. The case study example included in this chapter builds on the information presented in chapter 1 and shows the relationships between projected capital costs and operation and maintenance (O&M) expenses and the revenue increases required to meet these costs, maintain prudent cash reserves, and comply with applicable revenue bond covenants.

DEVELOPMENT OF THE FINANCIAL PLAN

The financial plan is intended to reflect the annual cash expenditure needs of the utility and is the first step in review of the sufficiency of existing rates. The objective of developing the financial plan is to determine the cash needs, or revenue requirements, and anticipated timing of utility costs in order to ensure that adequate funds are available to meet these requirements as they occur. The basic financial plan for a small government-owned utility normally includes

- Revenues—operating and nonoperating,
- Operation and maintenance (O&M) expenses,
- Debt service (principal and interest payments) on borrowed funds,
- Capital costs
  - allowances for normal annual repairs and replacement of existing facilities,
  - cash-financed expansions and improvements to the system,
- Other cash requirements for items such as payments in lieu of taxes,
- Combined cash balances,
- Reserve requirements.

In addition to these cash requirements, a utility may also have outstanding revenue bonds or debts or other loans that have associated bond/loan indenture requirements that must also be considered in establishing the adequacy of the revenue under existing rates. These debt covenants may, in certain instances, determine the cash needs of the utility and thus need to be reflected in the financial plan.

A multiyear time horizon is recommended because it provides a long-term view for planning purposes and allows the utility to better anticipate and prepare for major financial impacts from changes in operations or capital requirements. For financial planning purposes, it is recommended that the plan be developed for a 3-, 5-, or even 10-year period. In essence, the financial plan looks at both the immediate financial impacts (rate impacts) of the current test year being reviewed and enables the utility to plan for or normalize, if possible, any future revenue requirement impacts during the planning period. The case study included in this chapter utilizes a five-year period and is essentially composed of four interrelated tables. Table 2-1 is a five-year projection of revenues based on the example utility's current rates. Table 2-2 separates O&M expenses in sufficient detail to allow independent estimates of significant cost categories. Table 2-3 includes the capital spending plan and the dedicated capital funding sources. Tables 2-1, 2-2, and 2-3 all "feed" summary data to Table 2-4. Table 2-4 adds the elements of anticipated operating revenue (from existing rates and other fees) and cash balances by combining the available revenues with the O&M expenses and capital costs on a summary table, to present the "big picture" of cash flows and financial performance over the five-year study period. In most instances, dollar values have been rounded to the nearest thousand.

Revenues

Typically the first component developed in a financial plan is the projection of revenues under existing rates. Revenues are the principal sources of income to the utility. There are three types of revenue common to most utilities: rate or user charge revenue, miscellaneous operating revenue, and nonoperating income, including contributions to capital.

Rate revenue. Rate revenues include funds received from customers for water service. There are several different methods of forecasting water rate revenues. The preferred method is to base revenues on the number of service connections and amount of metered water consumption, including consideration of the expected growth rate for each year of the projection period. Recognizing these factors will allow the utility to more accurately forecast revenue under existing rates, as well as provide consistency with the rate-design process through the use of a common set of assumptions throughout the process. This method is illustrated for the example utility in Table 2-1. If the data is available, the forecast of rate revenues should be developed by class of service (e.g., residential, commercial) on an annual basis for each year of the forecast period.

Table 2-1 Projected rate revenue

Line No.		Base	Year 1	Year 2	Year 3	Year 4	Year 5
	Unmetered Accounts*						
1	Residential	200	203	206	209	212	215
2	Nonresidential	40	41	42	43	44	45
3	Total unmetered accounts	240	244	248	252	256	260
4	Current rate per account per month	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00
5	Revenue from unmetered accounts	$72,000	$73,000	$74,000	$76,000	$77,000	$78,000
	Metered Accounts*						
6	Residential	1,900	1,929	1,958	1,987	2,017	2,047
7	Nonresidential	110	112	114	116	118	120
8	Total metered accounts	2,010	2,041	2,072	2,103	2,135	2,167
9	Current rate per account per month	$12.50	$12.50	$12.50	$12.50	$12.50	$12.50
10	Revenue from metered accounts	$301,500	$306,000	$311,000	$315,000	$320,000	$325,000
	Metered Consumption—1,000 gal†						
11	Residential	240,000	243,663	247,326	250,989	254,779	258,568
12	Nonresidential	45,000	45,818	46,636	47,455	48,273	49,091
13	Total metered consumption	285,000	289,481	293,962	298,444	303,052	307,659
14	Current consumption rate per 1,000 gal	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
15	Consumption revenue	$427,500	$434,000	$441,000	$448,000	$455,000	$461,000
16	Total all-rate revenue	$801,000	$813,000	$826,000	$839,000	$852,000	$864,000

*Based on a 1.5% annual growth rate; varies because of rounding.
†Assumes water use per account in base year continued at the same level in subsequent years.

An alternative that may be used to forecast revenue is to review historical revenue data and apply an appropriate growth rate to these data to project revenue for future years. If the historical revenue method is used, it is important to adjust for variables that impacted past billings and revenues (e.g., weather, conservation, local economy) and, thus, could potentially skew future projections. In addition, any projected changes in rates and the impact on historical revenues need to be taken into account, since the projection of revenues in the financial plan is to be stated in terms of revenues under existing rates. As indicated in chapter 1, the utility should strive to develop and maintain adequate records of customers by meter size and class of service, as well as consumption data by class, since the projection of these parameters impacts the utility's operations, its income, and ultimately its rates and revenues.

The base year revenues, as illustrated in Table 2-1, are estimated at $801,000. Using 1.5% annual growth rates for both the residential and nonresidential accounts and assuming that the base-year water use per account does not change, annual rate revenue will increase by 1.5% using the example utility's existing rates.

Miscellaneous revenue. This category of revenue includes all miscellaneous fees and charges for service provided other than for water service (e.g., bad check fees, reconnect fees, meter testing fees, interest earned on invested cash in various funds and accounts). These revenue sources will likely be projected based on historical results and any known changes occurring on the system, such as the implementation of a new fee or adjustments to existing fees.

Nonoperating income. This revenue category includes interest on capital funds such as debt service reserves, construction funds, and contributions in aid of construction (contributions) collected from new customers and developers, such as system development charges (also known as impact or tap fees), which are related to the capital costs of utility investment associated with providing service to new customers. System development charges are used to assist with the financing of system assets. These charges are one-time charges, and the utility should refer to its local laws as to the appropriate use of these funds. In some jurisdictions, revenue from these charges must be tracked separately from regular rate or miscellaneous revenues because they may only be used to defray capital costs.

Unlike contributions to capital, both rate revenue and miscellaneous revenue are sources of funds that can generally be used to offset any type of utility-related expenditure, whether capital or operating in nature.

Cost Categories

There are four major cost categories that are generally considered when developing the financial plan. These four cost categories are O&M expenses, debt service, capital costs, and, as applicable, taxes. A typical starting point for developing a projection of the expenditures within these cost categories is a utility's annual operating and capital budgets. Historical costs are also a good source of information and guide in providing a basis for the projections of future cost levels beyond the current budgeted levels. From these historical expenditures, consideration will be given to identifying nonrecurring costs, future anticipated costs such as new employees, or an increase in operation expenses and/or capital costs due to the addition of new or expanded facilities.

O&M expenses. The first cost category that is included in the development of the financial plan is O&M expenses. These expenses include the day-to-day expenditures for such items as labor, materials, utilities (such as power), supplies (such as chemicals), and miscellaneous expenses. These items will be expensed during the budget period (e.g., over one year) as opposed to being capitalized and depreciated as long-term assets (e.g., the purchase of a pump).

The first step to consider when projecting O&M expenses is to determine the format. Ideally, these expenditures are maintained in a format that parallels the various water service functions (e.g., source of supply, treatment, pumping, transmission). Tracking costs on a functional basis identifies how much of the total cost is represented by each element of the system, which ultimately simplifies the establishment of cost-of-service–based rates. A standard classification of operation expenses, as published by the National Association of Regulatory Utility Commissioners (NARUC), is encouraged and, if followed, provides for the necessary functionalization of O&M expenses.

If O&M expenses are not maintained on a functional basis, the utility could use its existing accounting records and/or budget documents to project O&M expenses. Small utilities often maintain separate line item expenditures for labor and payroll-related expenses, including retirement, professional services, power and chemicals, insurance, and miscellaneous expenditures. The most important consideration is to separate O&M expenses into sufficient detail to allow the application of different rates of growth or changes in the overall level of certain expenses as appropriate. For example, labor costs may generally rise in proportion to the overall level of inflation over time (if for no other reason than to cover increases in employee benefit costs) or may be influenced or governed by a collective bargaining agreement. It is important to project these expenses separately from other expense elements that may remain relatively fixed over time or have some other pattern of change that is significantly different from inflationary growth.

Contract payments, for example, are generally set by the terms of the contract and may or may not include an inflationary adjustment. Transfer payments to other city or municipal departments (if the water utility is part of a city or other larger entity) may also have a growth pattern that differs from inflation, and as such should be treated separately.

To develop projected O&M expenses, the starting point is typically the current operating budget. This document should have recognized historical expense levels, with adjustments being made for future expenditure levels recognizing known or projected changes, such as an additional source of water supply, changes in operations, impacts of a new treatment plant, and/or compliance with new or changing regulations. Some typical examples may include additional personnel costs, reflecting known changes in labor contracts, or simply anticipated inflationary increases.

Table 2-2 shows an example projection of O&M expenses for a five-year projection period. In this case, year 1 of the projection period is the current operating budget for the example utility. For projection purposes, an annual inflation rate of 3% has been applied to all cost categories with the exception of the maintenance category. In year 3 a $50,000 incremental increase in maintenance is reflected over and above the 3% inflation rate. For the example utility, this reflects a change in maintenance activity or program that is permanent (at least for the balance of the study period). It is noted that for the example utility, the breakdown of O&M expenses is available by expense category and not by utility function.

Debt service. One commonly used method of financing capital improvement projects is the use of long-term debt. By issuing long-term debt (bonds) or relying on loans, a utility spreads the costs of the capital improvement over the repayment period, e.g., typically a 20- to 30-year period, thus matching the cost to both existing and future customers who will benefit from the improvement. The annual principal and interest payments (debt service) must be included in the financial plan. The example in this chapter has assumed the issuance of long-term debt as a tool to smooth out capital costs from year to year.

Table 2-2 Summary of projected O&M expenses

Line No.	Category	Year 1	Year 2	Year 3	Year 4	Year 5
1	Payroll and payroll-related	$165,000	$170,000	$175,000	$180,000	$185,000
2	Maintenance	144,000	149,000	203,000	209,000	215,000
3	Professional fees	26,000	27,000	27,000	28,000	29,000
4	Power	31,000	32,000	33,000	34,000	35,000
5	Insurance	21,000	21,000	22,000	23,000	23,000
6	Office and billing	31,000	32,000	33,000	34,000	35,000
7	Education and certifications	5,000	5,000	5,000	6,000	6,000
8	Permits	7,000	7,000	8,000	8,000	8,000
9	Telephone	4,000	4,000	4,000	5,000	5,000
10	Trucks	8,000	8,000	9,000	9,000	9,000
11	Pension plan	10,000	11,000	11,000	11,000	12,000
12	Public notices	2,000	2,000	2,000	2,000	2,000
13	Other utilities	5,000	5,000	5,000	6,000	6,000
14	Total O&M costs	$459,000	$473,000	$537,000	$555,000	$570,000

Frequently, a long-term debt obligation will require the utility to achieve various financial ratios. These ratios and/or other requirements are contained in the debt covenants or bond indenture and should be thoroughly understood by the utility as the financial plan is prepared. One such ratio is the debt service coverage ratio. A debt service coverage ratio is a financial requirement to enhance the financial capability of the utility to meet its existing and future debt service obligations. The debt service coverage ratio is typically defined as annual net operating revenues divided by annual debt service, where net operating revenues are generally defined as total operating revenue minus total O&M expenses. The ratio must always be higher than 1.0, but how much higher is usually defined by the covenants entered into at the time of the bond sale or loan agreement. The requirement for debt service coverage is typically in the range of 1.10 to 1.30 times annual or maximum debt service. Higher coverage requirements are typically associated with revenue bonds as compared to a general obligation debt that is backed or supported by the full faith and credit of the community. A revenue bond is generally secured only by the revenues of the water utility.

Capital costs. The capital costs of the utility include the capitalized equipment purchases, renewals and replacements, and that portion of capital construction projects of the utility that are financed directly from annual system revenues. Such capital costs recovered directly from system revenues, along with the issuance of long-term debt (and potentially the use of grant funds), provide the sources of funding for the utility's capital improvement program (CIP).

In the development of the projection of annual capital costs, the utility should utilize available documents such as master plans, developer-prepared plans, or utility-generated capital improvement programs. If these sources of data are not available, the utility should generate a capital improvement program that defines the future needs of the utility. Ideally, at least a five-year program should be developed to better anticipate future capital and funding needs.

The CIP should take into consideration a number of issues. Included among these are the identification of the years over which various projects are anticipated to be constructed, a general description of each project, and the associated costs. In addition, any new operating costs that are anticipated once the project is complete or on line (e.g., personnel to operate a plant or power costs for a pumping station) should be identified. The capital program should also attempt to prioritize the needs of the individual capital projects in any given year. This becomes important if funds or construction time become limited in a particular budget year. For the example utility, a multiyear CIP and funding program is provided in Table 2-3. The objective of this table is to enable the utility to determine the optimal mix of funding sources, displayed under sources of funds, available to complete the capital plan while keeping rate impacts to a minimum.

The financing of the capital costs should consider any funding sources that may be available to help offset capital costs. Such funding sources may consider system development charges, grants, developer contributions, low-interest state-revolving loans, and bonds. Additional funding sources for capital, other than revenue-financed capital improvements, will help the utility minimize the impact of capital program costs.

Table 2-3 Summary of five-year capital improvement program

Line No.		Year 1	Year 2	Year 3	Year 4	Year 5	5-Year Total
	Capital Outlays						
	Water Supply						
1	Well pump, motor, equipment at well*	$0	$0	$150,000	$300,000	$0	$450,000
2	Chemical treatment unit at well*	0	0	125,000	400,000	0	525,000
	Storage Capacity						
3	0.5-mil gal tank at well site*	0	0	150,000	250,000	0	400,000
4	0.5-mil gal tank for north zone	0	150,000	250,000	0	0	400,000
	Pumping Capacity						
5	Add 500 gpm booster pump at Ave. B site	0	0	0	50,000	150,000	200,000
	Mains						
6	Water main replacements	0	0	0	125,000	125,000	250,000
7	Unidentified	350,000	211,000	0	0	118,000	679,000
8	Total capital outlay	$350,000	$361,000	$675,000	$1,125,000	$393,000	$2,904,000
	Sources of Funds						
9	Impact fees	$50,000	$51,000	$52,000	$53,000	$54,000	$260,000
10	Grants	125,000	130,000	346,000	0	0	601,000
11	Loans	0	0	100,000	900,000	162,000	1,162,000
12	Capital funding required from rates	175,000	180,000	177,000	172,000	177,000	881,000
13	Total funding sources	$350,000	$361,000	$675,000	$1,125,000	$393,000	$2,904,000

*This funding source, as illustrated for the example utility (see Table 2-4), is likely to be a loan or line of credit that is accessed on an as-needed basis and does require the utility to achieve a minimum debt service coverage ratio—1.25 times the annual debt service or loan repayment amount.

When developing the capital program, it is important to remember that revenue funding causes a direct (1:1) impact on rate revenues. That is, for every dollar of capital funded from rate revenues, one dollar must be collected from rate revenues. In contrast, using a debt instrument has a less immediate impact on rate revenues, but the impact is for an extended period of time (e.g., 20 years). Grant funding does not typically impact rate revenues, with the exception of when the grant requires matching local funds. The total anticipated annual capital funding required from rates (line 12 in Table 2-3) would be carried forward to the example financial plan, shown in Table 2-4 line 14, as the rate-financed capital costs component of the financial plan.

The fact that water utilities are made up of long-lived infrastructure and must plan for capital improvements over many years is an important reason to establish a financial plan. The utility's annual capital budget is a relatively short-term plan and is not intended to be used as a long-term planning tool. Since the capital improvement budget may fluctuate from year to year, it is important for planning and rate-setting purposes to establish the capital improvements financed directly from annual system revenues at an amount equal to the level of annual capital expenditures not funded by other sources, such as debt or system development charges.

Annual capital expenditures financed directly from operating revenues should provide, at a minimum, the amount necessary for normal renewals and replacements of existing, worn-out, or obsolete plant in-service, such as pumps, lines, valves, and meters. As a practical matter, the utility will need to assess these cash-financed improvement needs independent of the amount of annual depreciation expense, because depreciation expense is an accounting figure based on the original cost of the fixed assets placed in service in prior years and does not relate to currently needed renewals or replacements. Moreover, annual depreciation expense reflects the amortization or loss in value of all of the utility's assets, including major structures and facilities, which are largely financed by sources of funds other than direct annual rate revenues.

The phrase *depreciation expense* is often confused with *renewals and replacements* in rate making. The former refers to an accounting entry based on the amortization of the original investment (and therefore is often excluded as a cash expenditure for budgeting and rate-making purposes). Depreciation expense is also generally unrelated to the current physical condition or current cost of the fixed asset(s). On the other hand, the latter deals with capital expenditures needed to prolong or extend the useful life of the asset(s). Accordingly, the case study example has assumed annual rate revenue funding for renewals and replacements at 1.2 times the annual depreciation expense of the utility, or approximately $180,000 per year. Any capital costs in excess of the amount funded from annual revenue will need to be funded through other funding sources, such as system development charges, capital reserves, grants, or debt issues.

Taxes. Tax payments are an additional area that must be considered during the financial planning process. In addition to property taxes or a payment in lieu of taxes (PILOT), many communities may have a business and occupation tax or a state utility tax or franchise fee that may need to be considered when determining cash flow needs. Taxes are specific to each jurisdiction, and the individual utility should determine any applicable taxes and the most accurate means of projecting future tax responsibilities to be included in the financial plan.

Cash Balances

If the financial plan is to be an effective tool in projecting the need for future revenue/rate increases, it should also include any cash balances that are available for the water utility's use. Customers and elected officials may question proposed rate increases if the utility appears to be maintaining significant cash balances that could potentially be used to finance capital projects or offset other revenue requirements. For purposes of the example utility, the unrestricted beginning cash balance is assumed to be $200,000 (see Table 2-4, line 16). This balance changes over time as revenues and expenditures change.

The utility should make certain that any cash balances used in the financial plan to fund annual revenue requirements are not restricted to other purposes. It is also important to understand the nature of the cash balances. If extra cash is available in the operating or revenue fund because water demand exceeded projections and generated surplus water sales revenues, those monies should generally be available for any water utility purpose. However, if extra cash is available because system development charge revenues exceeded projections, those monies are usually restricted to being spent on the capital projects used to justify the charge, or for debt service. Restrictions on the use of system development charge revenues vary by state.

Reserves

Reserves are an accepted way to stabilize and support utility financial management. Water utilities that have issued debt to pay for capital assets will often have required reserves that are specifically defined to meet the legal covenants of the debt. In addition to these, utilities may also wish to establish other "targeted" reserves. Common reasons to do so are to have funds set aside for a specific upcoming financial need or project or for an amount that can be used to provide rate stabilization in years when revenues are unusually low or expenditures are unusually high. Various types of reserves and industry guidelines for setting reserve levels are discussed later in this chapter. For purposes of the example utility, a 25% O&M or cash reserve target (three months) has been established (25% of annual O&M expenses) along with a capital reserve equal to approximately one year of planned renewal and replacement infrastructure.

SUMMARY OF THE FINANCIAL PLAN

The multiyear financial plan will provide the utility a view of its anticipated financial position after total operation expenses and capital costs are deducted from projected revenue under existing rates. The financial plan will identify the overall level of revenue adjustment required to cover the future operation and capital needs as set forth in the financial plan. This forward look will assist the utility in determining if expenses need to be reduced or if the necessary revenue adjustments should be implemented and, if so, whether the adjustments should be made all at once or possibly phased in over time.

The revenues and cash balances, and the four cost categories discussed earlier (O&M expenses, debt service, capital costs, and taxes), as well as planned reserves, comprise the elements covered by the financial plan. The example financial plan has used the operating and capital budgets for the year 1 projections and reflects a 1.5% annual growth rate for water service revenues based on current rates (accounts and consumption) and a 3% annual escalator for miscellaneous revenue and O&M expenses (with the exception for the previously discussed maintenance category). These factors were recognized in the projections shown in Tables 2-1 and 2-2, which

have been carried forward to the financial plan shown in Table 2-4. The projected financing of the capital improvement program, developed in Table 2-3, has also been carried forward to Table 2-4.

The example financial plan illustrates that revenue increases ranging from 32% to 57% will be required during the five-year time horizon. It is important to note that the results of the financial plan are cumulative. That is, any revenue or rate adjustment in a prior year will reduce the amount required in subsequent years. Alternative revenue/rate plans are discussed in chapter 3.

ESTABLISHING TARGET RESERVE BALANCES

The level of reserves maintained by the utility is another important financial planning consideration that should be reviewed annually. Many utilities, as well as financial rating agencies and the investment community as a whole, place special emphasis on reserve fund balances that are adequate to serve as a cushion or protection to the financial security for the utility under potentially adverse conditions. The basis for or rationale related to the maintenance of adequate reserve balance levels is twofold. First, it helps to assure the utility that it will have adequate funds available to meet its financial obligations in times of varying needs. More important, it provides a framework around which financial decisions can be made to determine when reserve balances are inadequate or excessive and what specific actions need to be taken to remedy the situation.

Utility reserve balances can be thought of as similar to a savings account. Reserve balances are funds that are set aside for a specific cash flow requirement, financial need, project, task, or legal covenant. These balances are maintained in order to meet short-term cash flow requirements, and at the same time, minimize the risk associated with meeting financial obligations and continued operational needs under adverse conditions.

It is important to establish financial policies that clearly state the basis for establishing targeted reserve balances. Financial policies should articulate how these balances are established, their use, and how to determine the adequacy of the reserve fund balances. For planning purposes, the reserve balances should be reviewed annually during the budgeting process to monitor current levels and assure conformance with existing policies and practices. Decisions can be made to maintain, increase, or decrease the reserve balances, as appropriate, depending on the impact of such decisions for the upcoming budget period. A utility should review the philosophy or approach used to establish reserve balances every three to five years. This time frame seems appropriate given that debt levels and capital infrastructure activity can vary during this time, and changes in this factor have an effect on the appropriate level of reserve balances. This type of review allows for the philosophy or practice of establishing reserve balances to be changed or modified to better reflect the existing conditions and issues.

GENERAL OVERVIEW OF INDUSTRY STANDARDS

A starting point for discussing adequate funding for reserve balances is to consider the current practices of the water utility industry. This section discusses the common approaches or practices used by the water utility industry to establish reserve balances. In this process, it is important for smaller utilities to begin considering the establishment and maintenance of various funds in relationship to their specific needs or areas. The most common reserve balances are usually established around the following four areas: operating, capital, contingency, and debt.

Table 2-4 Summary financial plan

Line No.		Year 1	Year 2	Year 3	Year 4	Year 5
	REVENUE					
	Operating Revenues					
1	Service revenue—water sales*	$813,000	$826,000	$839,000	$852,000	$864,000
2	Miscellaneous fees	2,000	2,000	2,000	2,000	2,000
3	Total operating revenues	815,000	828,000	841,000	854,000	866,000
	Nonoperating revenues					
4	Tap/connection fees	10,000	10,000	10,000	10,000	10,000
5	Interest income	10,000	10,000	10,000	10,000	10,000
6	Other revenue	5,000	5,000	5,000	5,000	5,000
7	Total nonoperating revenues	25,000	25,000	25,000	25,000	25,000
8	**Total revenue**	840,000	853,000	866,000	879,000	891,000
	EXPENDITURES					
9	**Total O&M Expenses**	459,000	473,000	537,000	555,000	570,000
10	**Subtotal: Net operating income**	381,000	380,000	329,000	324,000	321,000
	Debt Service					
11	Debt service—existing	150,000	150,000	150,000	150,000	150,000
12	Debt service—new	0	0	9,000	87,000	101,000
13	**Total debt service**	150,000	150,000	159,000	237,000	251,000
14	**Rate financed capital costs**	175,000	180,000	177,000	172,000	177,000
15	**NET INCOME (LOSS) FROM OPERATIONS**	**56,000**	**50,000**	**(7,000)**	**(85,000)**	**(107,000)**
16	**Plus: Beginning cash balance**	200,000	256,000	306,000	299,000	214,000
17	**Ending cash balance before reserves**	256,000	306,000	299,000	214,000	107,000
	RESERVES					
18	O&M reserve	115,000	118,000	134,000	139,000	143,000
19	Capital reserve	456,000	456,000	456,000	456,000	456,000
20	**Total reserves**	571,000	574,000	590,000	595,000	599,000
21	**ENDING CASH BALANCE AFTER RESERVES**	($315,000)	($268,000)	($291,000)	($381,000)	($492,000)
	CUMULATIVE REVENUE AND RESERVE DEFICIENCY					
22	(line 21 divided by line 9)	**–39%**	**–32%**	**–35%**	**–45%**	**–57%**
	DEBT SERVICE COVERAGE					
23	(line 10 divided by line 13)	**2.54**	**2.53**	**2.07**	**1.37**	**1.28**

*Revenues at current rates from Table 2-1; values rounded.

Operating Reserves

Operating reserves are typically established to provide the utility with the ability to withstand cash-flow fluctuations. Another term for this reserve fund balance is a working capital reserve. There can be a significant length of time between when a system provides a service and when a customer may pay for that service. A study of the utility's historic cash flow and an aging of its account receivables balance can accurately quantify the time period between delivery and payment for service. In addition to timing, the volume of cash flow can be affected by weather and seasonal demand patterns. This is a larger issue for some water utilities than it is for others.

For those who do not have sufficient information to conduct this type of analysis, there are various industry standards that are in use. A 45- to 90-day (approximately 6 to 13 weeks) O&M reserve is a frequently used industry norm. Because of the potential delay in payment, many utilities attempt to keep an amount of cash equal to at least 45 days or one eighth of their annual cash O&M expenses in an operating reserve to mitigate potential cash flow problems. The reserve level will be a policy decision for the utility based on the financial comfort level of the utility and will also be dependent on its billing frequency. It may also be dependent on the utility's access to short-term "loans" from other sources. For example, if the utility is part of a municipal organization or district, it may have access to working capital funds that would allow for the maintenance of lower reserves. To the extent these funds are "accessed," the utility should plan for the repayment of such funds.

Repair and Replacement Reserves

A capital reserve balance, or a repair and replacement reserve, is intended to be used to replace system assets that have become worn out or obsolete. For this reason, annual depreciation expense is frequently used as a metric to determine the minimum level of funding for this capital reserve. It is important to understand that depreciation expense is an accounting concept for estimating the decline in useful life of an asset and does not represent the current replacement cost of that asset. Therefore, an optimal balance may be an amount that is greater than annual depreciation expense to approximate replacement cost. Capital replacement reserves for equipment and main replacements or other normal annual capital additions and replacements are typically estimated at the rate of 1% to 2% of total original cost asset value of the utility's property.

Contingency Fund

The contingency reserve fund balance is essentially "insurance" against unanticipated emergencies or failure of the utility's most vulnerable system components. This reserve provides funding for emergency repairs or replacements, typically those caused by natural disasters such as hurricanes, floods, earthquakes, tornados, fires, and similar natural disasters. One method for determining the balance to maintain in such a reserve is to determine the cost of replacing the most expensive facility of the utility system and reserving an amount equal to that cost, less any potential insurance payments that may be applicable. Another method is to base the level of reserve on the historical records and experience of the utility in dealing with such emergencies and disasters, reflecting the chance of incidence of these situations. Determining the emergency reserve level for a system is also a function of management objectives and overall system reliability. The need for a contingency reserve may be mitigated or even eliminated through the establishment of a close working relationship with local lending institutions and creation of an available line of credit to quickly draw on during such a period.

Debt Reserves

Establishment of a debt reserve is legally required by the covenants and indentures of most revenue bonds and may be required by some general obligation bonds. Many state lending programs also have similar requirements. The establishment of a debt reserve provides security to the bondholders that adequate funds will be available to pay the debt service obligations, even under a distressed situation.

The debt service reserve fund is typically established at an amount equal to the lesser of the maximum annual debt service on all outstanding senior parity bonds, or 120% of the total annual debt service, or 10% of its bond issue amount. Often this amount is included in and funded from the principal amount of the bond issue and serves to secure the debt service payment to bondholders. However, it can also be funded from current-year rate revenues over a period of years, e.g., funded monthly over the first 60 months after the issue date. Bond surety insurance can be purchased in the amount of the required debt service reserve requirement, in lieu of maintaining an actual funded balance for this reserve.

Establishment of appropriate reserve balances will provide utility management with additional resources to help manage the financial position of the utility and ensure financial stability. The reserves provide a buffer in lean years and give the utility greater flexibility at all times because there is “money in the bank” that can be utilized to take advantage of opportunities that may arise. The reserve recommendations contained within this discussion should be tailored to the specific needs of the utility. Some of the reserves may not be required or appropriate for all utilities.

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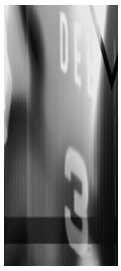

Chapter 3

Determining a Pattern of Revenue Increases and Test-Year Revenue Requirements

INTRODUCTION

Chapter 2 discusses the importance of developing a multiyear financial plan projection. Determining the pattern of annual revenue adjustments and establishing the test year revenue requirements for setting rates are integrally related to the financial plan. The test year is the annual period for which rates are developed. The test year generally corresponds to the upcoming budget year or a period of years, e.g., a five-year projection period. For regulated utilities, the test year may in fact be the most recently completed year as adjusted for known and measurable changes. For the example utility, rates are illustrated in chapter 4 for a five-year test period.

The cash flow projection from the previous chapter shows the level of annual revenue adjustment required in each year of the five-year projection period (see Table 2-4, line 22), based on the indicated deficiency in projected revenue under existing rates in meeting the annual revenue requirements, including meeting targeted reserve fund levels.

The indicated revenue increases shown on Table 2-4 are stated for each year as if no revenue adjustments were made in any prior year of the projection period. However, for the purpose of determining the annual revenue adjustments in each year of the projection period, it is necessary to take into account the effect of revenue adjustments that are proposed to be adopted in prior years of the projection period.

EVALUATING THE SUFFICIENCY OF REVENUES PROJECTED UNDER EXISTING RATES

In identifying the test year revenue requirements for rate-setting purposes, it is necessary to first evaluate the sufficiency of projected revenues under existing rates. The cash flow projections presented in chapter 2 provide a basis for this evaluation. Line 22 of Table 2-4 shows the percentage adjustments in revenue necessary for each year. Line 23 of Table 2-4 tests the adequacy of revenues under existing rates to provide the required debt service coverage. From these values it can be seen that the existing revenues, although adequate to achieve the required 1.25 times debt service coverage rates, are not sufficient to establish the targeted reserves.

Line 15 of Table 2-4 shows that if no revenue adjustments are adopted, cash flow surpluses of $56,000 and $50,000 will occur in years 1 and 2, respectively. The debt service on the new debt (e.g., loan or line of credit) used to fund a portion of the CIP begins in year 3 at $9,000 and is $87,000 in year 4 and $101,000 in year 5, as shown on line 12 of Table 2-4. This increase in cash requirements in years 3, 4, and 5 is primarily responsible for cash flow turning negative in these same years, as shown on line 15 of Table 2-4.

Line 22 of Table 2-4 shows that increases in revenue are required due to deficiencies in targeted reserve fund balances, not the overall cash balance, which is positive before consideration of the reserves (see line 17 of Table 2-4). Line 16 shows that the beginning cash balance in year 1 is $200,000 compared to the reserve requirement in year 1 of $571,000, shown on line 20 of Table 2-4. Even when the cash flow surplus of $56,000 in year 1 is added to the beginning balance, the cash balance before reserves on line 17 is $315,000 short of the required reserves, as shown on line 21 of Table 2-4.

Because the example utility is generating a positive cash flow in years 1 and 2, its management has several choices regarding adoption of rate revenue increases. These choices include various strategies regarding rate revenue adjustments that will bring reserves up to the required levels and also correct the cash flow deficiencies that begin to appear in year 3. It is interesting to note that rate revenue increases adopted in the earlier years will provide additional revenue that will mitigate the cash flow deficits in the later years, at least to some extent.

Therefore, it is important for any utility and, as illustrated, the example utility to develop a plan of revenue adjustments to provide sufficient revenues to meet both its reserve and cash flow requirements over the projection period. The question facing utility management is, what are the revenue requirements for rate-setting purposes in each year that will provide sufficient revenues within an acceptable level of rate adjustments in terms of the impact on the utility's customers?

DETERMINING REVENUE REQUIREMENTS IN THE CONTEXT OF A PLAN OF RATE REVENUE ADJUSTMENTS

Utility managers often prefer a plan of revenue adjustments that minimizes the impact on their customers in any one year. This requires that the revenue requirements for rate-setting purposes be examined throughout the entire projection period, taking into account the effects of prior-year revenue adjustments on subsequent years' financial performance.

Several approaches can be taken to developing a plan of revenue adjustments. First, "just-in-time" revenue adjustments can be determined to provide only the revenue increase (or decrease) required to overcome the revenue deficits (or

surpluses) in each year of the projection period. A plan with one large rate revenue adjustment in year 1 and no revenue adjustments thereafter is another option, although often unlikely and unpopular. Finally, a plan with equal percentage increases in revenue each year may be preferable. This alternative is dependent on the variation in the annual increases required and the necessity of fund balances or lines of credit being available to carry the utility through some years when the levelized annual increases may be insufficient to meet all of the utility's reserve and cash flow requirements. The determination of these alternative revenue adjustments for rate-setting purposes is discussed in the balance of this chapter.

Other multiyear scenarios of rate revenue adjustments are also possible. The above-referenced examples were chosen for discussion simply to demonstrate the potential choices a utility manager has in order to achieve the objectives regarding a program of revenue adjustments while providing the required revenue in each year of the projection period.

In some of the alternative plans discussed, the utility may have to fund a portion of the projected deficits (1) by accepting a lower level of reserves for a period of time, (2) from a line of credit, or (3) from some other source. If such sources of temporary funding are available, those plans may better achieve the objective of reducing rate shock, which occurs when the utility is required to implement a large rate increase in one year.

EVALUATION OF ALTERNATIVE PLANS FOR DETERMINING REVENUE ADJUSTMENTS

To determine the revenue requirements to be used for rate-setting purposes, it is first necessary to develop a plan that considers utility management's objectives regarding annual revenue adjustments. If the cash flow analysis (Table 2-4) shows that annual revenue adjustments required beyond the initial year are nominal, the actual revenue increase required in the first year of the projection period may be adequate to adjust rates to meet the revenue requirements for the entire period. However, if required revenue adjustments are increasing or are large in any year of the projection period, utility management may want to explore strategies to normalize the impact of revenue adjustments on the utility's customers over a period of several years.

Alternative 1: Just-in-Time Revenue Adjustments

This plan identifies the annual percentage revenue adjustments (increases and decreases) that would be necessary in each year of the projection period if revenues were adjusted each year by just enough to meet the indicated revenue deficit for the year, i.e., produce an ending cash balance after reserves (Table 2-4, line 21) equal to zero. Note that the percentage adjustments discussed in the following alternatives have been rounded to the nearest whole percentage for presentation purposes; however, the numerical examples carry the actual percentage adjustments out to more significant figures.

Alternative 1 simply determines the annual revenue adjustments necessary in each year to overcome the percentage deficiency identified on line 22 of the cash flow analysis shown in Table 2-4, taking into account, in each year, the effect of prior year revenue adjustments. This alternative does not attempt to smooth out the impact of revenue adjustments but simply determines the annual adjustments necessary on a just-in-time basis each year.

In the case of the example utility, adoption of a rate increase equal to the deficiency identified for year 1 on line 22 of Table 2-4, or a 39% rate revenue adjustment, will provide sufficient revenue to eliminate the deficiency in the cash reserves for the year in question. If left unchecked, the increase will also provide more than sufficient revenues in all subsequent years of the projection period to meet all of the projected revenue requirements.

In fact, a just-in-time revenue plan would incorporate both rate revenue increases and decreases, as illustrated in Table 3-1. However, few governing bodies (i.e., city councils or boards) would knowingly adopt a just-in-time plan of back-to-back rate revenue increases and decreases. For this reason, two other revenue increase plans were developed and are shown in Table 3-1.

It should be noted that debt service coverage, shown on line 23 of Table 2-4, is already adequate in all years of the projection period, under existing rate levels, assuming a debt service coverage requirement of 1.25 for the example utility. For the example utility, revenue increases are not needed to maintain debt service coverage. If debt service coverage was not adequate under existing rate levels with this or any other revenue adjustment plan in any year, higher revenue adjustments may have to be implemented to provide the needed debt service coverage. Therefore, debt service coverage should be monitored in this and all revenue adjustment plans.

Table 3-1 Summary of alternative revenue increase plans (in thousands of dollars)

Line No.		Year 1	Year 2	Year 3	Year 4	Year 5
	Alternative 1					
	Just-in-Time Revenue Adjustments					
1	Annual revenue adjustment (%)	39%	(32%)	9%	8%	2%
2	Revenue change from cumulative adjustments	$315	($52)	($19)	($86)	($106)
3	Annual cash flow (deficiency)	$371	$3	$16	$5	$4
4	Annual net balance (deficiency)	$0	$0	$0	$0	$0
	Alternative 2					
	Single Increase in Year 1					
5	Annual revenue increase (%)	12%	0%	0%	0%	0%
6	Revenue increase from year 1 increase	$101	$102	$103	$104	$105
7	Annual cash flow (deficiency)	$157	$153	$98	$21	$0
8	Annual net balance (deficiency)	($214)	($64)	$18	$34	$30
	Alternative 3					
	Equal Annual Increases					
9	Annual revenue increase (%)	4%	4%	4%	4%	4%
10	Revenue increase from cumulative adjustments	$30	$62	$96	$131	$168
11	Annual cash flow (deficiency)	$86	$112	$90	$48	$65
12	Annual net balance (deficiency)	($285)	($176)	($102)	($59)	$2

NOTE: Complete alternative cash flow plans are shown in appendix A.

This revenue adjustment plan (just-in-time revenue adjustments) provides sufficient revenue in each year but requires a large increase of 39% in one year followed by a 32% decrease in year 2. Therefore, if this utility could accept lower levels of reserves in the early years of the projection period, a lower rate adjustment in year 1 could be implemented. This option is evaluated in the following section.

Alternative 2: Single Increase in Year 1

Another extreme example of accelerating the plan of annual rate revenue adjustments to be sufficient for the entire projection period would be a revenue increase in year 1 that would be adequate to just meet the overall revenue requirements for the entire study period. As discussed in the just-in-time revenue adjustments plan for the example utility, this plan required only a rate increase in year 1 to meet the targeted reserve levels (without a decrease in year 2, this plan would produce cumulative surpluses). However, it is often the case that a utility will not need a rate adjustment until a later year of the projection period. In that case, accelerating the plan of rate adjustments to year 1 and implementing a rate increase in year 1 of sufficient magnitude to provide sufficient revenues in all subsequent years could be considered. Typically, it is unusual to have revenue increases implemented until they are actually needed; however, phasing in, or normalizing, increases or the avoidance of future rate shocks are valid considerations for implementing an increase earlier than absolutely required.

For the example utility, it is possible to adopt a single rate adjustment in year 1, which is considerably smaller than the just-in-time adjustment discussed in the previous subsection, provided the utility is willing to accept reserve levels in years 1 and 2 that are somewhat below the targeted levels. In this plan, an overall revenue increase of 12% in year 1 will generate sufficient additional revenues over the projection period to result in adequate cash flow in year 5 (line 7, Table 3-1) and reserve balances slightly in excess of required levels in years 3 through 5 (line 8, Table 3-1).

However, utility managers and regulatory bodies (i.e., city councils, utility boards, commissions) may prefer to implement several modest revenue increases rather than one large rate revenue increase in a single year that will cover the entire five-year projection period. With equal annual percentage rate adjustments, rate shock can be smoothed out. However, it is important to consider the effects on cash flow balances throughout the period and the ability of the utility to accept lower-than-desired levels of reserves for some years of the projection period. The next section evaluates the option of equal annual percentage rate adjustments.

Alternative 3: Equal Annual Increases

This plan identifies the annual percentage revenue increases that are necessary in each year of the projection period to allow implementation of equal annual percentage revenue adjustments, while resulting in sufficient revenues to meet all revenue requirements by the end of the five-year projection period. To meet the cumulative projected reserve and cash flow deficiencies under existing rates from the example shown in Table 2-4, equal annual percentage rate adjustments of 4% per year will be required.

Line 10 of Table 3-1 shows that this rate adjustment plan will generate an increasing amount of revenue each year from the cumulative impacts of the annual rate adjustments. Table 3-1 also shows on line 11 that this rate adjustment plan will result in a positive cash flow in each year of the projection period. The only drawback to this rate adjustment plan is that in years 1 through 4, the reserve balances are

below targeted reserve levels, as can be seen on line 12 of Table 3-1. However, the deficits in the reserve balances are lower each year and the balance or reserve targets are met by year 5.

This plan results in a higher cumulative percentage increase in rates (20%) over the projection period than the single increase of 12% in year 1. However, it does have the advantage of smoothing the impact of rate revenue adjustments over each year of the projection period. Therefore, if it is the objective of utility management to smooth the impact of rate revenue adjustments over the five-year projection period, this plan could be implemented if (1) the utility could accept reserve balances below desired or targeted levels in the first four years of the projection period, or (2) a line of credit or other funding source were available to supplement or fund the reserve fund deficits if needed in the early years of the projection period.

Similar plans could be developed with equal annual percentage increases in revenue for fewer years, say years 1 through 3, with no revenue adjustments thereafter. Such plans would require higher annual revenue adjustments to achieve the same level of annual revenue in fewer years.

Developing Rates to Generate the Revenue Requirements

Once the revenue requirement for rate-setting purposes has been determined for year 1 in the context of the five-year financial plan projection, there are two approaches to calculating specific rates to generate the required revenue. First, if the current rate structure reflects appropriate cost allocations, is in conformance with generally accepted rate-setting criteria, and little has changed regarding costs, system configuration, and/or customer usage patterns, the current rates may be adjusted appropriately on an across-the-board basis by the percentage adjustment in revenues identified for year 1. For example, all components of the rate—the fixed and volume rates—could be increased 39%, as illustrated in the just-in-time revenue adjustments plan. However, if cost allocations or rate structure need revisiting, design rates that are in conformance with generally accepted cost allocation and rate-setting criteria, as discussed in the next chapter, and that will generate the specific revenue requirement for rate-setting purposes for year 1 of the cash flow projection.

The decision as to which rate adjustment method to employ should take into consideration how long it has been since rates have been examined in conjunction with a comprehensive cost-of-service analysis. This analysis can identify the impact of changes that have occurred to costs, system configuration, and/or customer usage patterns and the impact of these changes on cost allocation and/or rate design. If a cost-based rate design has been completed recently (say, within the past three years) and there has been little change in the system other than normal growth and increases in costs, an across-the-board approach to rate adjustments may be appropriate.

In the subsequent years of the projection period, rate adjustments required to generate the revenue requirements for rate setting can be made by either an across-the-board increase to the prior year's rates or through detailed cost allocation and/or rate design to recover the revenue requirement for rate setting. Again, the decision as to which method to employ should consider how long it has been since a cost-of-service study has been completed and what changes have occurred to costs, system configuration, and/or customer usage patterns that might require an updated rate design.

Updating the Revenue Requirements Analysis

After establishing a plan of revenue adjustments in the context of a five-year financial plan, it is important to monitor and adjust the plan over time. A good time to review the plan is during the annual budgetary process. Actual beginning-of-period reserve fund balances can be adjusted within the plan, the past year can be dropped, year 1 can include the new proposed budget, an additional year can be added as year 5, and the projections can be updated to include these changes.

If year 1 results were close to the projected results and if the budget for the new year 1 is close to the projections for year 2 in the previous analysis, it may be possible to continue with the same plan of rate revenue adjustments developed in the previous plan. However, if year 1 results and/or the budget for the new year 1 are significantly different than projected, changes may be required to the plan of future annual revenue adjustments.

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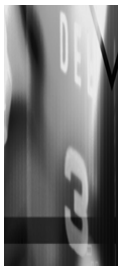

Chapter 4

Rate Design

INTRODUCTION

The data and resource constraints faced by a water utility can also affect the rate design alternatives available to these utilities. This chapter addresses how rates can be designed to generate sufficient revenue to meet the utility's revenue requirements under this selected alternative and illustrates a rate design that emphasizes simplicity, while at the same time recognizing cost-of-service and equitability considerations. However, this simple rate design may not address all of the issues and the unique complications faced at most every utility, whether it is a large or small system. Where potential complications do exist, the reader is referred to the relevant sections of Manual M1.

The preceding chapters projected revenue that would be generated under existing rates and then developed a pattern or series of revenue or rate adjustments that could be used to meet the identified revenue requirements and some or all of the targeted reserves. That analysis is important in that it defines the magnitude of needed rate revenue adjustments over a five-year planning period. For the example utility, the alternative selected to raise additional revenue to meet revenue requirements over the study period was alternative 3, equal annual increases. This alternative is used to illustrate the rate design example included in this chapter.

In broad terms a three-step process can be used for selecting a rate structure and designing rates:

Step 1. Define rate or pricing goals and objectives.

Step 2. Evaluate rate alternatives.

Step 3. Understand and communicate outcomes.

This chapter begins with an examination of the rate or pricing goals and objectives. It is important for utility management to consider exactly what it wants a rate structure to accomplish prior to setting out to design rate structure alternatives. Next, basic terminology regarding rate structures is discussed. Fixed and variable charges are separately identified and defined. After this foundation has been laid, an example methodology for the design of rates is identified. Finally, rate evaluation

issues are briefly mentioned. The following chapter addresses impacts, the issues related to communicating proposed changes in existing rates to the customer, and involving the public to achieve better understanding of the process.

RATE OR PRICING OBJECTIVES

The form of the applicable rate structure is largely dictated by the objectives of the utility. The rate structure illustrated in this chapter stresses simplicity and cost recovery. Utilities serving a single customer class and having limited customer and system water demand data or other similar characteristics may want to consider the degree to which the rate structure can be understood by its customers and supported by sound data and analysis. Incorporating other objectives into rate design may require consideration of some of the other more involved rate structures as presented in Manual M1.

Typical objectives that can guide rate design are illustrated in Figure 4-1 and may also include the following:

Cost recovery—the primary objective of any rate structure is to recover the revenue requirements or the costs of providing water service.

Revenue stability—rate structures should provide revenue that matches changes in the costs of water service.

Simplicity—simple rate structures are most generally preferred to complicated ones; customer understanding is important to achieving customer acceptance.

Ease of administration—feasibility and ease of administration are often important concerns. This objective might also include the capabilities of the billing system.

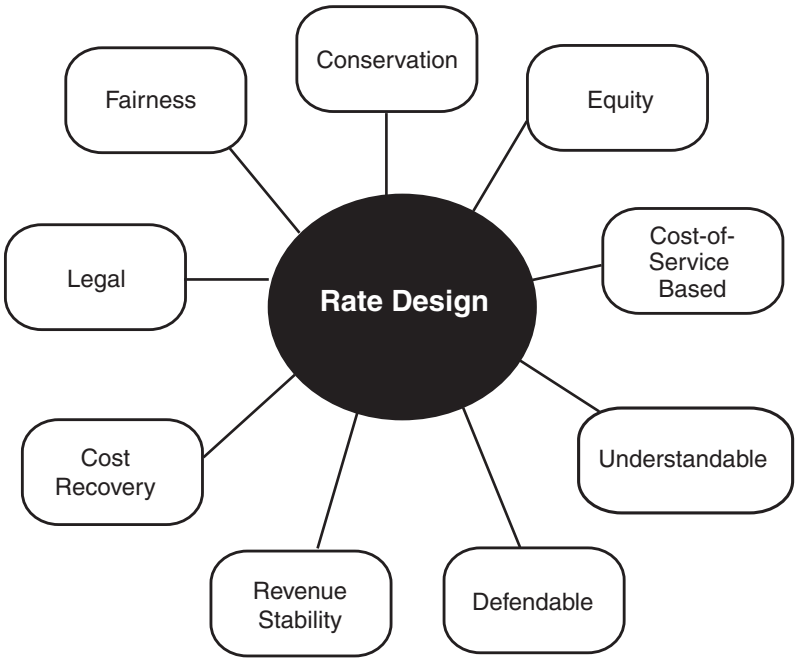

Figure 4-1 Rate design objectives

Affordability—keeping water service affordable to customers enhances the collection of bills as well as revenue stability.

Resource efficiency—if customers face prices that reflect the costs of providing water service, they can make informed choices about efficient water use, and water waste is minimized.

Legal—the rate structures should be consistent with applicable laws and regulations.

Consistency with cost-of-service principles—rate structures consistent with cost-of-service principles are easier to defend and they make it easier to recognize that those who cause costs should pay for them.

Fairness—rate structures viewed as fair are preferred from the standpoints of customer acceptance and legal defensibility.

RATE DESIGN CONCEPTS

A basic distinction about the charges within a rate structure relates to whether the charges are *fixed* or *variable*. This distinction flows from the cost causation principles—some costs of serving customers do not vary with the amount of water consumed. Referred to as *fixed costs* or *customer costs*, these costs typically include meter reading, billing, accounting, collection expenses, and maintenance and capital costs related to meters. These costs are generally recovered through a *fixed* charge per billing period per customer or meter that does not vary with consumption but may vary by meter size. It is not unusual for small utilities to include other cost elements in the fixed charge. This is typically done to enhance revenue stability and in some instances customer understanding and acceptance. At the utility's discretion, the fixed charge may also include a very small water usage allowance.

The varying amount of water that customers consume is the driving force for other costs for the utility. Based on cost causation, these variable costs are typically recovered through a consumption charge that varies in proportion to the level of a customer's consumption. These costs are often defined to include all costs not recovered through the fixed charge. The *variable* charge is alternatively referred to as a commodity charge or a volume charge.

Additional distinctions can be made within either the fixed or the variable charges. Because they are based on the costs of servicing customers, fixed charges are also referred to as *customer* charges or service charges. A *meter* charge is a fixed charge that increases with meter size. A *minimum* charge is typically used to refer to a fixed charge that includes a water usage allowance per billing period.

The charge per unit of water consumed is variable in that the amount the customer pays varies based on the amount of water the customer consumes. This chapter only examines a *uniform* rate—a single charge for each unit of consumption. There are also block rates where the rate charged per unit of water changes, depending on how much water is consumed. (A block of water is a predefined amount of water consumption; for example, the first block might be defined from zero to 15 billing units of water consumption per billing period.) The *declining* or *decreasing* block rate has a volumetric charge that decreases for larger blocks of consumption. An *inclining* or *increasing* block rate is characterized by a volumetric charge that increases for larger blocks of consumption. *Seasonal* rates are volume charges that change depending on the season of the year. In general, a higher rate is charged during the peak season. Figure 4-2 illustrates these variable pricing rate options, and Manual M1 has a chapter describing each rate form.

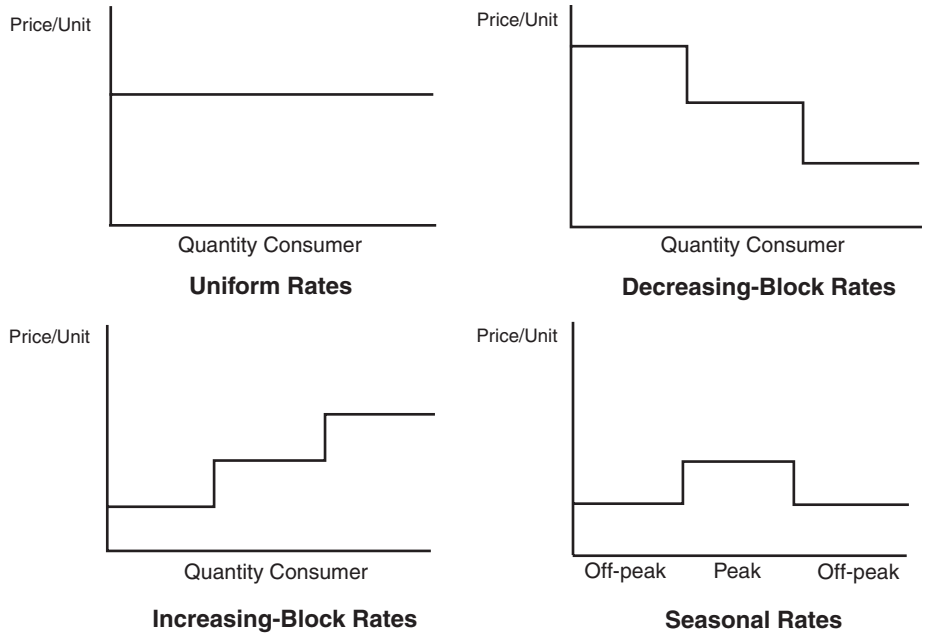

Figure 4-2 Alternative rate forms

Rate Design Example

The previous two chapters discuss the determination of projected revenue requirements that extend over a five-year financial planning period. The projection of the revenues under the existing rate structure indicates that projected revenue is less than the revenue requirements and that a revenue rate adjustment is necessary. The following section of this chapter discusses the development of new rates for the five-year study period, using the equal annual increases scenario identified in Table 3-1, with a 4% increase in rate revenue for each year.

The proposed approach to rate design shown in this chapter is to separately examine and establish fixed and variable components of the rate structure.

Fixed charges. Have the costs changed materially for the fixed or customer service charge portion of the existing rate schedule? To answer this question, the utility needs to examine those costs typically associated with fixed charges. These costs would include meter reading, billing, accounting, collection expenses, and maintenance and capital costs related to meters. In general terms, including only these costs would yield an estimated fixed charge that might range from as low as $2.00 to $3.00 up to as much as $5.00 to $8.00 per account per month. For the example utility, it is assumed that other costs are also included in arriving at the fixed charge of $12.50 per month. As previously noted, it is not unusual for small utilities to have higher fixed charges as a means of enhancing revenue stability or for other reasons relating to customer acceptance and understanding.

For the sake of simplicity in this example, it is assumed that there have been no substantive changes in the costs included in the charge, other than inflationary increases. Accordingly, the existing fixed charge of $12.50 per month for metered accounts has been increased only for inflation over the five-year analysis period. A similar assumption is made with regard to the current $25.00 charge to unmetered accounts (see Table 4-1).

Another simplifying assumption for purposes of this example is the use of a fixed charge that is the same for all accounts, regardless of meter size or customer class. Generally, the costs of meter reading, billing, accounting, and collection expenses do not vary by meter size; if these were the only costs included in the fixed charge, they would result in a uniform charge for all accounts. However, meter maintenance expenses and the capital costs associated with meters do typically increase by meter size and their inclusion would result in a fixed charge that varies by meter size. If other system costs were included in the fixed charge, these might be "allocated" to the various meter sizes using equivalent meter capacity or flow ratios and result in even greater differences in the fixed charge between the meter sizes. In systems that have relatively few customers served with the larger meter sizes, a single fixed charge is sometimes used and is reflected in the rate calculations for the example utility.

Table 4-1 projects revenues to be generated over the five-year period from the fixed service charge as applied to both metered and unmetered accounts.

Variable rate. Fixed charge revenue, when deducted from the total revenue requirement and after considering nonoperating revenues, yields the amount to be generated from the variable or volumetric rate (see Table 4-2). The total revenue requirement on line 1 of Table 4-2 is the amount of revenue needed to achieve the financial performance results under alternative 3, equal annual increases. Table 4-2 begins with this value and deducts other revenues (line 2) and the revenue to be generated from the fixed service charge. The resulting balance, line 4 of Table 4-2, is the revenue to be generated from the volume rate. Dividing this value by the projected volumetric sales projection, line 5, produces the volume rate per 1,000 gal of metered water use—a rate of $1.50 per 1,000 gal (the current rate) in the base year, increasing to $1.85 per 1,000 gal in year 5.

Table 4-1 Illustration of projected revenue from fixed service charge

Line No.		Base	Year 1	Year 2	Year 3	Year 4	Year 5
1	Metered accounts*	2,010	2,041	2,072	2,103	2,135	2,167
2	Number of bills per year	12	12	12	12	12	12
3	Annual bills	24,120	24,492	24,864	25,236	25,600	26,004
4	Meter charge†	$12.50	$12.88	$13.27	$13.67	$14.08	$14.50
5	Revenue from metered accounts	$302,000	$315,000	$330,000	$345,000	$361,000	$377,000
6	Unmetered accounts*	240	244	248	252	256	260
7	Number of bills per year	12	12	12	12	12	12
8	Annual bills	2,880	2,928	2,976	3,024	3,072	3,120
9	Unmetered account charge†	$25.00	$25.75	$26.52	$27.32	$28.14	$28.98
10	Revenue from unmetered accounts	$72,000	$75,000	$79,000	$83,000	$86,000	$90,000
11	Total fixed service charge revenue	$374,000	$390,000	$409,000	$428,000	$447,000	$467,000

*Future growth projected at 1.5% per year.
†Future cost increases projected at 3.0% per year.

Table 4-2 Illustration of volumetric/usage charge calculation

Line No.		Base	Year 1	Year 2	Year 3	Year 4	Year 5
1	Total revenue requirement*	$828,000	$870,000	$915,000	$963,000	$1,012,000	$1,063,000
2	Less: Nonoperating revenue†	(27,000)	(27,000)	(27,000)	(27,000)	(27,000)	(27,000)
3	Less: Fixed service charge revenue‡	(374,000)	(390,000)	(409,000)	(428,000)	(447,000)	(467,000)
4	Net revenue requirement from volume sales	$427,000	$453,000	$479,000	$508,000	$538,000	$569,000
5	Volumetric sales in 1,000 gal§	285,000	289,481	293,962	298,444	303,052	307,659
6	Volumetric rate per 1,000 gal	$1.50	$1.56	$1.63	$1.70	$1.78	$1.85
7	Annual percentage change in volume rate		4.3%	4.2%	4.5%	4.3%	4.2%

*Total revenue requirement amounts to revenues under existing rates plus nonoperating revenue (see appendix A, Table A-3).
†From Table 2-4, lines 2 and 7.
‡From Table 4-1, line 11.
§Future growth projected at 1.5% per year.

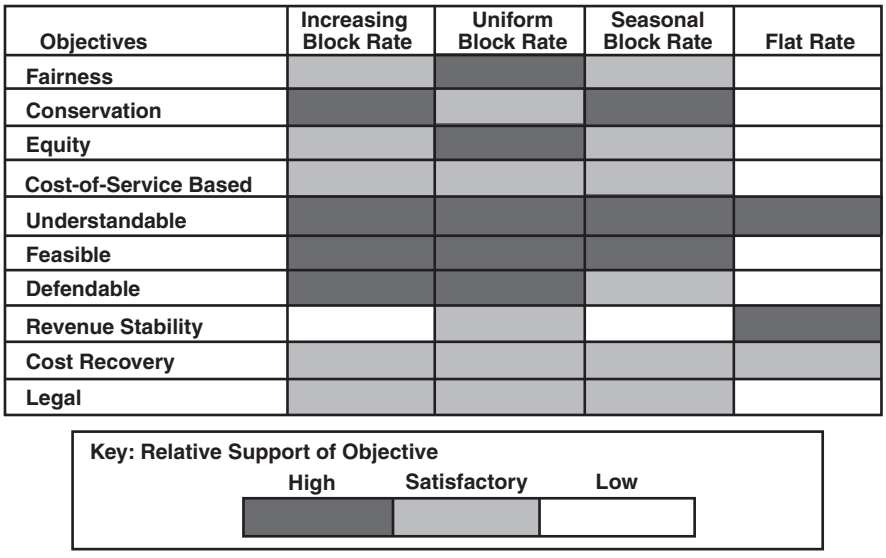

Figure 4-3 Example of evaluation

RATE EVALUATION

Rate evaluation is the process of measuring a particular rate design against the desired objectives to see how it complies with these objectives. This process is illustrated in Figure 4-3. Because elements of the objectives and the "ranking" can be subjective, different audiences will likely arrive at different weightings or results as compared to those illustrated in Figure 4-3.

If the outcome of the rate design implies large changes in water rates for all customers or a subset of customers, a bill impact analysis is advised. A bill impact analysis is defined as the difference in a customer's bill under the existing structure versus the proposed rate structure. Additionally, a phased-in strategy for rate implementation may also be advisable. If significant rate changes are anticipated, public involvement, discussed in the following chapter, will also take on heightened importance.

If the stability of revenue relative to costs is a major concern, several procedures or analyses may need to be initiated. First, a range of potential revenue variability due to an adverse reaction to rate adjustments can be estimated by substituting high and low estimates for anticipated sales. Second, a good general adaptive approach is to consider more frequent rate adjustments, that is, annual, smaller increases instead of less frequent, larger increases. Routine rate adjustments give the opportunity for mid-course corrections due to changing economic and financial conditions.

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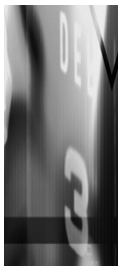

Chapter 5

Special Considerations

In addition to the data gathering and quantitative analysis required to develop new rates, other steps and considerations are involved in successfully implementing those rates. These include providing for public involvement and communication and obtaining necessary regulatory or other approvals. Also addressed in this chapter are other factors that may require special consideration in the rate-setting process, including the phase-in of rate changes, system development charges and the funding of capital facilities, and the need for separate rates by customer class.

PUBLIC INVOLVEMENT

In today's environment, public involvement in the rate-making process is not only necessary but also desirable. Early involvement will provide an opportunity to generate understanding and help foster public acceptance of the water rate proposal. It is common for community laws or regulations to require public notice of proposed rate changes as well as a public hearing. Possibly the worst time to first hear about a potential problem with the proposed water rate adjustment is during a public hearing. In many cases, such a problem will be one of perception as opposed to one of fact and can be more readily discussed and understood in a workshop-type setting as opposed to the often highly charged atmosphere of a public hearing.

At a minimum, public involvement should include meetings or workshops with a cross section of community stakeholders to present the water rate proposal. For the meetings to be effective, an effort must be made to anticipate how the proposed water rate changes will affect each of the stakeholder's constituencies. Typically, they will want to know how the proposed rate adjustment will affect their particular account, homeowner's association, apartment complex, or business. When dealing with these groups, it is often appropriate and meaningful to compare the proposed rate increase to the rate of inflation, as illustrated in Figure 5-1. Furthermore, showing the proposed rate increase in both dollar amounts and as a percentage increase is important, as often times an increase as large as 10% may only amount to pennies per billing period. Table 5-1 is a listing of important considerations for defining and executing a public input plan.

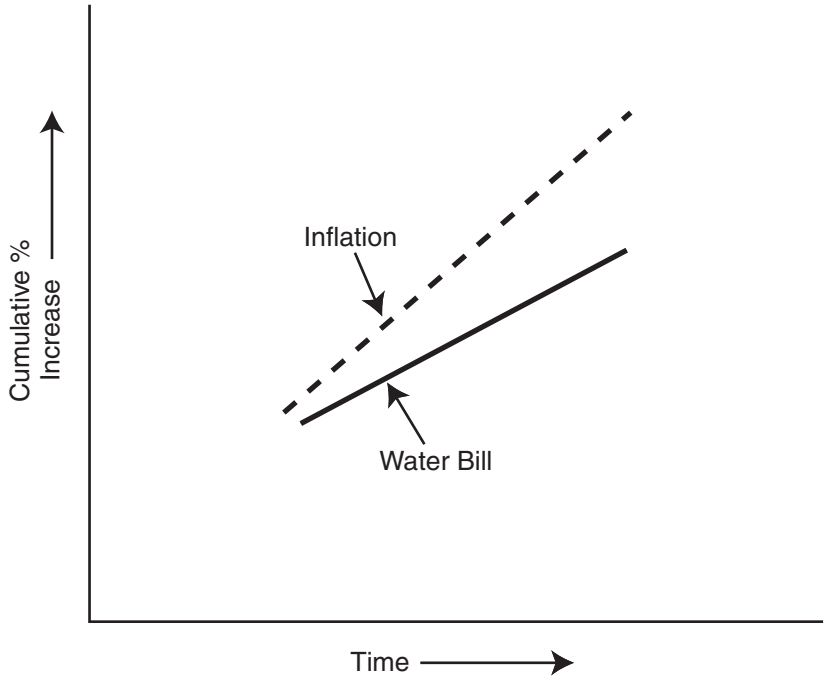

Figure 5-1 Water bill vs. inflation graph

Table 5-1 Basic strategies to winning public support

• Identify your public involvement team.
• Create a message that simply defines the problem.
• Create opportunities for true public involvement.
• Let the public help develop solutions.
• Plan ahead and prepare to be responsive.
• Develop mechanisms to receive feedback.
• Develop a process that does not "hurry to create a failure" but is "patient to create a success."

In meetings with different interest groups, it is important to try to determine what their concerns will be. This knowledge will provide two benefits. First, presentations can be tailored to address their concerns and issues. Second, and, more important, the knowledge and the empathy displayed will demonstrate that the utility has made an effort to understand and address their "concerns."

Another commonly used approach to public involvement is one in which the utility's policy-making body appoints several representatives to a citizens' or rate-payer advisory committee. The membership of such a committee should be large enough to ensure that all major potential stakeholder segments are represented. Management of this type of committee is very time-intensive; such a committee should typically only be used when significant changes to a utility's rates and charges

are being considered. The committee process generally has three phases: education, review, and decision.

During the education phase, time is spent educating the committee on the issues being faced and creating the need for a rate change. This could be water rates or system development charges, but it is important that the committee has a clear understanding of the current situation so they can effectively evaluate the alternatives that are being presented.

The review phase is one in which the committee starts to review the different proposals to evaluate the impact on various customer groups using the background information they have been given. This involves the who, how much, and when analyses.

Finally, the decision phase occurs when the committee has been provided the necessary background information, has had the opportunity to analyze the proposals, and is prepared to make a recommendation. It is always desirable to have a consensus recommendation, but sometimes this is not possible. If this is the case, it is very important that the different points of view are represented in a clear way to the governing body, which will make the final decision. It might be helpful to have an advocate for each position present his or her view. With a citizens' advisory committee, it is also important to establish up front the level of input into the rate-making changes that the committee will have. Typically, their role is simply advisory, with the final decisions being delegated to the governing body of the utility. In instances when a citizens' advisory committee is used, a professional facilitator may help the process. The facilitator would be an "independent" third party who can help move the process to an effective conclusion. If an outside rate consultant is used to complete the technical analysis, this person may also serve as the facilitator.

REGULATORY APPROVAL OF RATES

Responsibility and authority for the regulation of water utility rates differs depending on the ownership of the utility. In the case of investor-owned (private) water utilities, rates are normally regulated by the state or provincial utility commission. (Depending on jurisdiction, this commission may be called the public service commission, public utility commission, board of public utilities, or corporation commission.) Government or municipally owned (public) water utilities may also be regulated by the state or provincial utility commission under certain circumstances, such as when they serve customers outside their corporate boundaries. However, in most instances, the rates of public water utilities, especially small systems, are subject to the review and approval of a local authority such as the municipal or city council, board, water district, or commission.

Regardless of the specific agency or forum responsible for approving a particular utility's water rates, it is important to be familiar with the specific requirements for the approval of those rates. Procedural requirements such as public notice, public input via hearings or written comments, council votes, or referendums must be followed to ensure that rates are not subject to legal challenge on procedural grounds. If the requirements for a given utility are complex or it is certain that the utility is subject to regulation by a state or provincial utility commission, it is advisable to obtain assistance from legal counsel in preparing for the proceedings related to a rate adjustment.

RATE CHANGE PHASE-IN

It is important to remember that a proposed rate adjustment has a limited life expectancy: no rate schedule is proposed to last indefinitely. As the facts and conditions

under which the proposed rate were based change (cost/conservation, etc.), the rates must also change. Furthermore, if the format of the proposed rates reflects a significant change from the existing rates, it might be prudent to implement the change in rates over a phase-in period. For example, if the proposed change in water rates is from a uniform volume charge rate form to an increasing block rate form, it may be appropriate to phase in this change over a period of years. For instance, the first set of tiered rates may be set so that there is perhaps only a small differential in the unit price for each tier. Each subsequent phase-in would expand the unit price differentials until the targeted differential is achieved. In the case of implementing new system development charges, a phase-in to achieve full cost recovery over a period of years is typical. Even if the final level of the charge is known, it may be best to phase in the increase over several years because of the business planning cycle. This allows the business community to have better knowledge of the date and amount of increases in advance so that development can proceed in an orderly fashion.

An alternative view regarding the phase-in of rate structure changes is worth noting. If the structure is being modified so as to achieve greater water use efficiencies, i.e., conservation, a phase-in plan may actually nullify or mitigate the desired outcome—actually reduce water use. A rate structure that is, by design, phased-in is intended to allow customers to "adjust" or become "accustomed to" the structure change and thus not achieve the stated objective of reduced water use.

SYSTEM DEVELOPMENT CHARGES AND FUNDING OF CAPITAL FACILITIES

System development charges, also referred to as connection, tap, capital recovery, impact, or plant investment fees, and responsibility for growth are often very controversial issues. The basic issue with growth is that it often requires substantial up-front investment in infrastructure. Typically, this will initially require existing customers to pay for a significant share of the investment. This is due to the timing of when the facilities need to be constructed relative to when the growth that will utilize the new capacity will actually occur. This cash flow problem can be very significant for a small system. This issue of the responsibility for growth is one of benefit and risk: who benefits when and who is at risk if the growth does not occur? The development community should be prepared to pay a proportionate share of the up-front cost associated with growth. They must recognize the responsibility for bearing at least a portion of the cost of the new facilities as a necessary part of the cost of their being able to do the business of developing the community.

Requiring up-front payments means that some general rules, guidelines, and policies should be established by the utility so that the development community knows that they will be required to financially bear some of the costs and risks of development and is aware of the specific cost obligations. This allows the development community to make the proper business decisions regarding the economics of their business plans. The existing customers of the system must also be prepared to bear some of the costs because they will receive some benefit from the economies of scale from the larger facilities and operations that growth creates.

RATES BY CUSTOMER CLASS

In presenting the principles and guidelines for determining rates for water service for small systems in this manual, it has been assumed that a simple set of rates will be developed that will apply to all customers. This is common practice for small systems

because such systems are often faced with resource and data limitations and may have a customer base that is predominately of a single class, e.g., residential. In such cases, it is often not practical to develop a more complex rate structure with rates by customer class unless there are specific circumstances that necessitate doing so. For example, where a water system's customer base consists entirely of residential customers and small commercial customers, developing rates by customer class is not likely to be either necessary or cost justified. However, if a system has a customer or customers with unique water usage characteristics or if it serves customers outside its municipal boundaries, developing rates to recognize the different characteristics of those customers may be appropriate. When a system is faced with the need to develop more complex rate structures with rates for different classes of customers, Manual M1 should be consulted.

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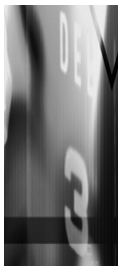

Appendix A

Alternative Cash Flow Plans

Table A-1 Alternative cash flow plan—just-in-time revenue adjustments

Line No.		Year 1	Year 2	Year 3	Year 4	Year 5
	REVENUE					
	Operating Revenues					
1	Service Revenue—Water Sales	$813,000	$1,146,000	$791,000	$875,000	$955,000
1a	Proposed Rate Adjustment	38.73%	–32.05%	9.00%	7.67%	2.11%
1b	Additional Revenue from Rate Adjustment	$315,000	($367,000)	$71,000	$67,000	$20,000
1c	Service Revenue—Water Sales	1,128,000	779,000	862,000	942,000	975,000
2	Miscellaneous Fees	2,000	2,000	2,000	2,000	2,000
3	Total Operating Revenues	1,130,000	781,000	864,000	944,000	977,000
	Non-Operating Revenues					
4	Tap/Connection Fees	10,000	10,000	10,000	10,000	10,000
5	Interest Income	10,000	10,000	10,000	10,000	10,000
6	Other Revenue	5,000	5,000	5,000	5,000	5,000
7	Total Non-Operating Revenues	25,000	25,000	25,000	25,000	25,000
8	**Total Revenues**	1,155,000	806,000	889,000	969,000	1,002,000
9	**Total O&M Expenses**	459,000	473,000	537,000	555,000	570,000
10	**Subtotal: Net Operating Income**	696,000	333,000	352,000	414,000	432,000
	Debt Service					
11	Debt Service—Existing	150,000	150,000	150,000	150,000	150,000
12	Debt Service—New	0	0	9,000	87,000	101,000
13	**Total Debt Service**	150,000	150,000	159,000	237,000	251,000
14	**Rate Financed Capital Costs**	175,000	180,000	177,000	172,000	177,000
15	**NET INCOME (LOSS) FROM OPERATIONS**	**371,000**	**3,000**	**16,000**	**5,000**	**4,000**
16	**Plus: Beginning Cash Balance**	200,000	571,000	574,000	590,000	595,000
17	**Ending Cash Balance Before Reserves**	571,000	574,000	590,000	595,000	599,000
	RESERVES					
18	O&M Reserve	115,000	118,000	134,000	139,000	143,000
19	Capital Reserve	456,000	456,000	456,000	456,000	456,000
20	**Total Reserves**	571,000	574,000	590,000	595,000	599,000
21	**ENDING CASH BALANCE AFTER RESERVES**	$0	$0	$0	$0	$0
22	**CUMULATIVE REVENUE AND RESERVE DEFICIENCY (line 21 divided by line 9)**	**0%**	**0%**	**0%**	**0%**	**0%**
23	**DEBT SERVICE COVERAGE (line 10 divided by line 13)**	**4.64**	**2.22**	**2.21**	**1.75**	**1.72**

Table A-2 Alternative cash flow plan—single increase year 1

Line No.		Year 1	Year 2	Year 3	Year 4	Year 5
	REVENUE					
	Operating Revenues					
1	Service Revenue—Water Sales	$813,000	$929,000	$944,000	$958,000	$971,000
1a	Proposed Rate Adjustment	12.40%	0.00%	0.00%	0.00%	0.00%
1b	Additional Revenue from Rate Adjustment	$101,000	$0	$0	$0	$0
1c	Service Revenue—Water Sales	914,000	929,000	944,000	958,000	971,000
2	Miscellaneous Fees	2,000	2,000	2,000	2,000	2,000
3	Total Operating Revenues	916,000	931,000	946,000	960,000	973,000
	Non-Operating Revenues					
4	Tap/Connection Fees	10,000	10,000	10,000	10,000	10,000
5	Interest Income	10,000	10,000	10,000	10,000	10,000
6	Other Revenue	5,000	5,000	5,000	5,000	5,000
7	Total Non-Operating Revenues	25,000	25,000	25,000	25,000	25,000
8	**Total Revenues**	941,000	956,000	971,000	985,000	998,000
9	**Total O&M Expenses**	459,000	473,000	537,000	555,000	570,000
10	**Subtotal: Net Operating Income**	482,000	483,000	434,000	430,000	428,000
	Debt Service					
11	Debt Service—Existing	150,000	150,000	150,000	150,000	150,000
12	Debt Service—New	0	0	9,000	87,000	101,000
13	**Total Debt Service**	150,000	150,000	159,000	237,000	251,000
14	**Rate Financed Capital Costs**	175,000	180,000	177,000	172,000	177,000
15	**NET INCOME (LOSS) FROM OPERATIONS**	**157,000**	**153,000**	**98,000**	**21,000**	**0**
16	**Plus: Beginning Cash Balance**	200,000	357,000	510,000	608,000	629,000
17	**Ending Cash Balance Before Reserves**	357,000	510,000	608,000	629,000	629,000
	RESERVES					
18	O&M Reserve	115,000	118,000	134,000	139,000	143,000
19	Capital Reserve	456,000	456,000	456,000	456,000	456,000
20	**Total Reserves**	571,000	574,000	590,000	595,000	599,000
21	**ENDING CASH BALANCE AFTER RESERVES**	($214,000)	($64,000)	$18,000	$34,000	$30,000
22	**CUMULATIVE REVENUE AND RESERVE DEFICIENCY (line 21 divided by line 9)**	**–23%**	**7%**	**0%**	**0%**	**0%**
23	**DEBT SERVICE COVERAGE (line 10 divided by line 13)**	**3.21**	**3.22**	**2.73**	**1.81**	**1.71**

Table A-3 Alternative cash flow plan—equal annual increases

Line No.		Year 1	Year 2	Year 3	Year 4	Year 5
	REVENUE					
	Operating Revenues					
1	Service Revenue—Water Sales	$813,000	$856,000	$902,000	$950,000	$999,000
1a	Proposed Rate Adjustment	3.73%	3.73%	3.73%	3.73%	3.73%
1b	Additional Revenue from Rate Adjustment	$30,000	$32,000	$34,000	$35,000	$37,000
1c	Service Revenue—Water Sales	843,000	888,000	936,000	985,000	1,036,000
2	Miscellaneous Fees	2,000	2,000	2,000	2,000	2,000
3	Total Operating Revenues	845,000	890,000	938,000	987,000	1,038,000
	Non-Operating Revenues					
4	Tap/Connection Fees	10,000	10,000	10,000	10,000	10,000
5	Interest Income	10,000	10,000	10,000	10,000	10,000
6	Other Revenue	5,000	5,000	5,000	5,000	5,000
7	Total Non-Operating Revenues	25,000	25,000	25,000	25,000	25,000
8	**Total Revenues**	870,000	915,000	963,000	1,012,000	1,063,000
9	**Total O&M Expenses**	459,000	473,000	537,000	555,000	570,000
10	**Subtotal: Net Operating Income**	411,000	442,000	426,000	457,000	493,000
	Debt Service					
11	Debt Service—Existing	150,000	150,000	150,000	150,000	150,000
12	Debt Service—New	0	0	9,000	87,000	101,000
13	**Total Debt Service**	150,000	150,000	159,000	237,000	251,000
14	**Rate Financed Capital Costs**	175,000	180,000	177,000	172,000	177,000
15	**NET INCOME (LOSS) FROM OPERATIONS**	**86,000**	**112,000**	**90,000**	**48,000**	**65,000**
16	**Plus: Beginning Cash Balance**	200,000	286,000	398,000	488,000	536,000
17	**Ending Cash Balance Before Reserves**	286,000	398,000	488,000	536,000	601,000
	RESERVES					
18	O&M Reserve	115,000	118,000	134,000	139,000	143,000
19	Capital Reserve	456,000	456,000	456,000	456,000	456,000
20	**Total Reserves**	571,000	574,000	590,000	595,000	599,000
21	**ENDING CASH BALANCE AFTER RESERVES**	($285,000)	($176,000)	($102,000)	($59,000)	$2,000
22	**CUMULATIVE REVENUE AND RESERVE DEFICIENCY (line 21 divided by line 9)**	**–34%**	**–20%**	**–11%**	**–6%**	**0%**
23	**DEBT SERVICE COVERAGE (line 10 divided by line 13)**	**2.74**	**2.95**	**2.68**	**1.93**	**1.96**

Glossary

ad valorem tax A state or local tax based on the assessed value of real or personal property.

annual operating revenue requirement The total revenues required on an annual basis adequate to meet all expenses and capital requirements of the utility.

bill frequency analysis A tabulation and summarization of customer bills and usages showing the number of bills rendered at various levels of water usage during a specified period of time.

bond covenants Terms of obligations incurred as conditions of the issuance of bonds.

bonded debt Indebtedness represented by outstanding bonds.

budget An estimate of proposed expenditures for a given period or purpose and a statement of the means of financing them.

capacity The water utility's ability to have resources available to meet the water service needs of its customers. Capacity is the combination of plant- and service-related activities required to provide the amount of service required by the customer. The plant facilities required are a composite of all types of facilities needed to provide service. It represents the ability of the water utility to meet the quantity, quality, peak loads, and other service needs of the various customers or classes of customers served by the utility.

capital expenditures Expenditures that result in the acquisition of or addition of fixed assets.

capital program A plan for capital expenditures to be incurred each year over a fixed period of years to meet capital needs arising from the long-term work program or otherwise. It sets forth each project or other contemplated expenditure in which the entity is to have a part and specifies the full resources estimated to be available to finance the projected expenditures.

cash basis The basis of accounting under which revenues are recorded when cash is received and expenditures are recorded when cash is disbursed.

commodity costs (variable costs) Costs that tend to vary with the quantity of water produced, including the costs of chemicals, a large part of power costs, and other elements that follow, or change almost directly with, the amount of water produced. Purchased water costs, if the water is purchased on a unit-volume basis without minimum charges or any associated demand charges, may also be considered as commodity costs.

connection charge A charge made by the utility to recover the cost of connecting the customer's service line to the utility's facilities. This charge often is considered as contribution of capital by the customer or other agency applying for service.

contribution in aid of construction (CIAC) Any amount of money, services, or property received by a water utility from any person or governmental agency that is provided at no cost to the utility. It represents an addition or transfer to the capital of the utility and is used to offset the acquisition, improvement, or construction costs of the utility's property, facilities, or equipment used to provide utility services to the public. It includes amounts transferred from advances for construction representing any unrefunded balances of expired refund contracts or discounts resulting from termination of refund contracts. Contributions received from governmental agencies and others for relocation of water mains or other plant facilities are also included. All contributions are carried as equity capital in audited balance sheets of publicly owned utilities.

cost allocation The procedure for classifying or assigning the costs of service to functional cost components for subsequent distribution to respective customer classes.

costs of service The operating and capital costs incurred in meeting various aspects of providing water service, such as customer billing costs, demand-related costs, and variable costs.

coverage ratios The margin of safety ratios associated with bonded indebtedness and preferred stocks, reflecting the ratio of the actual or projected net revenue available for debt service to debt service or other costs. These ratios range from debt-service coverage of principal and interest, to interest only, to all fixed charges, including preferred stock dividends and lease payments. Coverage may be expressed as a ratio or as a percentage.

customer classification The grouping of customers into homogeneous classes. Typically, water utility customers may be classified as residential, commercial, and industrial for rate-making and other purposes. For specific utilities, there may be a breakdown of these general classes into more specific groups. For example, the industrial class may be subdivided into small industry, large industry, and special. Some water systems have individual customers (large users) with unique water-use characteristics, service requirements, or other factors that set them apart from other general customer classes and thus may require a separate class designation. This may include large hospitals, universities, military establishments, wholesale service districts, and other such categories.

customer costs Costs directly associated with serving customers, irrespective of the amount of water use. Such costs generally include meter reading, billing, accounting, and collecting expenses and maintenance and capital costs related to meters and associated services.

debt An obligation resulting from the borrowing of money or from the purchase of goods and services.

debt service The amounts of money necessary to pay interest and principal requirements for a given year or series of years.

declining-block rates A schedule of rates applicable to blocks of increasing usage in which the usage in each succeeding block is charged at a lower unit rate than in the previous blocks. Generally, each successive block rate is applicable to a greater volume of water delivery than the preceding block(s).

demand costs Costs associated with providing facilities to meet demands placed on the system by customers. They include capital-related costs associated with those facilities plus related operation and maintenance expenses.

demand patterns Profiles and characteristics of the demand requirements of the system, specific customer class or classes, or an individual customer that indicate the frequency, duration, and amount of demand placed on the water production and delivery system.

depreciation The loss in service value that is not restored by current maintenance as applied to depreciable plant facilities. Depreciation is incurred in connection with the consumption or prospective retirement of plant facilities in the course of providing service. This depreciation is the result of causes known to be in current operation and against which the utility is not protected by insurance. Among the causes are wear and tear, decay, action of the elements, inadequacy, obsolescence, changes in technology, changes in demand, and requirements of public authorities. The proper level of depreciation expense at any given time should be based on the costs of depreciable plant in-service. The funds resulting from depreciation are available for replacements, improvements, expansion of the system, or for repayment of the principal portion of outstanding debt.

depreciation rate The annual rate at which capital facilities are depreciated, based on the estimated loss in value of the facilities, not restored by current maintenance, that occurs in the property due to wear and tear, decay, inadequacy, and obsolescence. It provides for the recovery of a utility's capital investment over the anticipated useful life of the depreciable assets.

expenditures Amounts paid or incurred for all purposes, including expenses, provision for retirement of debt, and capital outlays.

functional cost components The distinct operational components of a water utility to which separate cost groupings are typically assigned. In the base-extra capacity method of cost allocation, these are usually the components of base, extra capacity, customer, and direct fire-protection costs. In the commodity-demand method, they are the components of commodity, demand, customer, and direct fire-protection costs.

future capacity The capacity for service somewhat in excess of immediate requirements that is built into a utility in anticipation of increased demands for service resulting from higher uses by existing customers or from growth in the service area.

government-owned water utility A water utility created by state or other government-agency legislative action, with the mandate that the purposes of the utility are public purposes and that its functions are essential governmental proprietary functions. Its primary purpose is to provide its designated service area with potable water in an adequate supply at reasonable costs so that people of the area may promote their health, safety, and welfare. A government-owned water utility may be part of a municipal government operation, a county agency, a regional authority, or take such other form as is appropriate for its service area.

inverted block rates A schedule of rates applicable to blocks of increasing usage in which the usage in each succeeding block is charged at a higher unit rate than in the previous blocks. Generally, each successive block rate may be applicable to a greater volume of water delivery than the preceding block(s).

investor-owned water utility A utility owned by an individual, partnership, corporation, or other qualified entity with the equity provided by shareholders. Regulation may take the form of local or state jurisdiction.

minimum bill A minimum charge to a customer that includes a fixed volume of water delivered to the customer during the applicable period of time.

net revenues available for debt service Operating revenues less operation and maintenance expenses but exclusive of depreciation and bond interest. Net revenue available for debt service as thus defined is used to compute coverage for revenue-bond issues. Under the laws of some states and the provisions of some revenue-bond indentures, net revenues available for debt service for computation of revenue-bond coverage must be computed on a cash basis rather than in conformity with generally accepted accounting principles (GAAP). Sometimes, indenture provisions permit the inclusion of nonoperating revenue and system-development-charge receipts with operating revenue when determining net revenue available for debt service.

payment in lieu of taxes A payment made to a governmental entity by the government-owned utility instead of taxes.

rate blocks Elements of a schedule of charges for specific usages within certain defined volume and/or demand boundaries.

rate-making process The process of developing and establishing rates and charges. The process is comprised of four phases: (1) determination of revenue requirements; (2) allocation of costs to the functional components of the cost of service; (3) distribution of the functional costs of service to customer classes; and (4) development and design of a schedule of rates and charges to recover the revenue requirements.

rate schedule Schedule of the rates and charges to the various customer classes and customers.

revenue bond A bond payable solely from net or gross nontax revenues derived from tolls, charges, or rents paid by users of the facility constructed with the proceeds of the bond issue.

seasonal excess-use charges Charges for usage above pre-established levels, typically used during periods of peak use relative to use during off-peak periods.

seasonal rates Rates based on the cost-of-service variations with respect to system seasonal requirements. For example, higher rates may be charged during the summer months when a system peak occurs, which requires facilities not needed to meet lower winter loads.

self-sustaining water enterprise A water utility operating without subsidies given to or received from non-water utility operations.

service charge A fixed charge usually designed to recover customer costs.

system development charge A contribution of capital toward existing or planned future backup plant facilities necessary to meet the service needs of new customers to which such fees apply. Two methods used to determine the amount of these charges are the buy-in method and incremental-cost pricing method. Various terms are used to describe these charges in the industry, but these charges are intended to provide funds to be used to finance all or part of capital improvements necessary to serve new customers.

system development charge facilities Those facilities, or a portion of those facilities, that have been identified as being required for new customer growth. The cost of the facilities will be recovered in total or in part through system development charges.

test year The annualized period for which costs are to be analyzed and rates established.

treated water Water that has been obtained from supply sources and treated to produce potable water.

uniform volume charge A single charge per unit of volume for all water used.

unit cost The cost of producing a unit of a product or service. An example would be the cost of treating 1,000 gal of potable water for use by the water utility's customers.

unit of service An element of service for which a cost can be ascertained, such as thousand gallons, hundred cubic feet, million gallons per day, monthly bill.

unmetered or flat rate A fixed charge for unmetered service, often simply based on the number of fixtures and water-using devices of the customer.

user charges The monthly, bimonthly, quarterly user charges made to the users of water service through the general water rate structures of the utility for the utility's share of the cost of providing water service.

wholesale service customers Service in which water is sold to a customer at one or more major points of delivery for resale within the wholesale customer's service area.

working capital Cash, materials, supplies, and other similar current assets necessary in the operation of the enterprise. It is usually measured by the excess of current assets over the current liabilities or sometimes as a percentage of annual operation and maintenance expense levels.

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f. indicates a figure; *t.* indicates a table.

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