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The Basics of a Water & Sewer Rate Study

Joe Muscatello

University of Tennessee, Knoxville

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THE BASICS OF A WATER & SEWER RATE STUDY

BY JOSEPH MUSCATELLO, JR.

Compiled by
MUNICIPAL TECHNICAL ADVISORY SERVICE
of The University of Tennessee
in cooperation with The Tennessee Municipal League

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THE BASICS
OF A
WATER AND SEWER
RATE STUDY

By Joseph Muscatello, Jr.
Municipal Management Consultant

MUNICIPAL TECHNICAL ADVISORY SERVICE
The University of Tennessee
in cooperation with the
TENNESSEE MUNICIPAL LEAGUE
July 1984
Dear City Official:

The publication of the information contained in this document is an attempt, on the part of MTAS, to provide meaningful and understandable guidelines for the development of reasonable and adequate water and sewer rates. One of the most difficult decision processes that elected and appointed officials must deal with is rate-making. No action of an elected body receives more attention and scrutiny than the utility rate process except, of course, the property tax rate process. Likewise, where appointed utility boards are mandated to set rates, the same pressures come to bear at rate increase time.

We believe this publication contains some straightforward approaches to the establishment of fair and effective water and sewer rate structures. A review of this publication would be most helpful to any municipal official who anticipates being involved in a utility rate decision process. The manual is intended primarily for administrative staff. However, elected and appointed board members probably would gain much from a review of the document.

I would like to recognize and thank Mr. Joe Muscatello, MTAS management consultant, for developing and writing the manual. The product of his efforts will go far in providing direction for municipal officials seeking guidance in this area.

As always, your input and advice are valued. If you have questions, criticisms, or suggestions, please contact Joe or me at your convenience. Thank you for your continuing support and assistance.

Sincerely,

C. L. Overman
Executive Director
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SECTION I - INTRODUCTION
THE WATER RATE STUDY

Introduction

Water and Sewer utilities throughout the State of Tennessee and the entire nation have been confronted with ever increasing operating costs, as well as costs associated with implementing procedures to meet new state and federal regulations placed upon the utilities.

The State of Tennessee mandates that a municipal utility must be a self-sufficient operation. Revenues generated from sales and other sources from the utility must meet all expenses, both operating and non-operating, of the utility. Municipal utilities are audited as an enterprise operation, and must be operated separately from any other municipal fund.

The first step toward a self-sufficient utility operation is the determination of the actual costs and revenue involved in the operation. The major source of revenue is the sale of the product, water or sewer, and this revenue is determined by the rate charged to the consumer.

A municipal utility must charge a fair and equitable rate and must maintain a rate structure that will provide ample revenue to operate the utility in a safe and lawful manner.

A rate study should be a routine function of the utility to insure that adequate rates are charged and sufficient revenue is produced for the operation of the fund. A rate study should coincide with the yearly budget process.

This booklet will focus upon the elements involved in determining the need for sufficient rates, and will provide examples of setting an adequate rate structure to obtain the revenue required to operate the utility as an enterprise fund.
The following sections are incorporated in this manual:

- Reasons for Rate Increases
- Functions of A Rate Structure
- Types of Rate Structures
- Revenue Sources for Utilities
- Expenditures Required of Utilities
- A Rate Study Example

Each of these sections is designed to enable the user to recognize the need of a rate increase; determine the amount of revenue needed to operate; and to set a fair and equitable rate structure for all consumers of the system.

Reasons for Rate Increases

"Every incorporated city and town in this state, (Tennessee), is authorized and empowered to own, acquire, construct, extend, equip, and operate and maintain within and/or without the corporate limits of such city or town a waterworks system and to charge for such service."

(TCA 7-35-401.)

The above quoted section of State Law is the enabling legislation which grants municipalities the power to own and operate water and sewer systems, and to charge a fee for operating the utility. State Law requires that the rates charged must be sufficient to support the system. This includes operating and maintaining expenses, depreciation, and bond and interest charges.

(TCA 7-34-114.)

All utilities are faced with increasing expenses and the major source of revenue is provided by the rates charged. Periodically these rates must be increased to meet the rising expenses faced by the utility. As stated before, the municipal utility must operate the system as an enterprise, therefore the
need for rate adjustment must be monitored. "However, no municipality shall operate the utility as a source of revenue to the municipality, but shall operate such utility for the use and benefit of the consumer served by the utility and for the promotion of the welfare and for the improvement of the health and safety of the inhabitants of the municipality." (TCA 7-34-103.)

The above mentioned code sections require a municipality which owns and operates a water or sewer utility to charge adequate rates to cover all expenses, but prohibits rate charges that would generate excess revenue which would allow the municipality to operate other governmental functions with revenue from the utility system.

Since the municipality must operate the utility system in a manner which is self-sufficient, rate charges must generate enough revenue to pay for the total cost of the system.

There are a number of factors that continue to put upward pressure upon the rate structure of a utility system. These factors include, increasing operating and maintenance expenses, higher water quality standards, higher sewerage effluent quality standards, fire flow requirements, and system upgrading and extensions.

In order to maintain a safe and healthy environment and to promote economic growth, the utility system must continually make improvements to the infrastructure and to the operations system. These improvements are expensive and these costs must be offset by an increase in the rates charged for the service.

Some of the major factors that cause rate increases will be discussed in later sections and further information will be provided in the appendices.
SECTION II - FUNCTIONS AND TYPES OF RATE STRUCTURES
The establishment of a good rate structure is of primary importance for the utility system. There are a number of factors that should be considered when developing or updating a rate structure. The following criteria should be considered before setting the final structure:

- Generates sufficient revenue to pay for the total cost of the system.
- Distributes the costs of the system fairly across all user classes.
- Enables the customer accounting to be easily performed.
- Should be easily understood and accepted by the consumer.

The major function of a rate structure is to provide ample revenue to pay the total cost of a system. In all too many cases, municipal utility systems have implemented rate structures that are not generating sufficient revenue to meet the total cost of the system. Many do not provide for adequate depreciation, and a few systems are barely meeting the normal operating and maintenance expenses.

Another function of the rate structure is to spread the cost of the service to those benefited, approximately in proportion to the cost of providing the service and the benefit received from the utility. The failing of many rate structures are the unrealistic low minimum charges that are set. Yet, many report that those benefiting the greatest from the service are not paying in proportion to the benefit that is received. An equitable structure must take into account all user classes, and the rate must be placed according to benefit and use.
TYPES OF WATER RATES

There are a number of possible water rate structures which may be considered depending on the situation of the utility system. A few of the more common are: flat charges, uniform rates, declining block rates, and inverted block rates. Each have their advantages and disadvantages and there is little agreement as to the most equitable rate structure. The following will offer a brief explanation and will point out the strengths and weaknesses of each.

Flat Rate

This type is used in communities which do not meter water usage but charge the same rate to individuals in the same user class. All residents would be charged the same rate regardless of whether a large amount or a small amount of water was used. An advantage to the flat charge is that it is simple and avoids the initial cost of installing meters and the administrative expense of periodically reading meters. The disadvantages to this structure are that it encourages waste, penalizes the small users, and is not equitable when charge varies by type of user, (commercial, residential, industrial). This rate is primarily used for residential customers. The following graphs are used to show each rate structures effect on the consumer and pricing.²

<table>
<thead>
<tr>
<th>Price/Unit</th>
<th>Cost/Customers</th>
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2 Quantity

7
As quantity increases, the price per unit decreases, yet the cost to customer remains the same without regard to usage. The price would remain the same whether 2,000 gallons or 10,000 gallons is used.
Uniform Metered Rates

Under a uniform rate structure, a constant price per gallon is charged, regardless of the amount of water used. Uniform rates are simple and easy to administer; however, economies which may result from the processing of large quantities of water are not passed along to the consumer. This could tend to discourage water-consuming industries from locating in the community. Charging uniform rates may encourage consumers to adopt conservation measures.

<table>
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<th>Price/Unit</th>
<th>Cost/Consumers</th>
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<tbody>
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<td>Quantity</td>
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As quantity increases, the price per unit remains the same. The cost to the consumer is in direct proportion to the usage. There is no discount for high, (or low) usage.
Increasing Block - Step Rate

Under an increasing block rate structure, the price of water varies with the amount of water used. As consumption increases, the unit price increases with each successive consumption block. This approach is often used as a means to conserve water and has been used in drought emergencies. It can also be argued that since higher water use is generally associated with higher income, the system is equitably based on ability to pay, and that revenues to expand are generated by those who are responsible for excess demand. A drawback to this method is that larger users, (industrial and commercial) may pay a disproportionate share and may discourage industry from locating in the service area.

As quantity increases, the price per unit increases at a greater rate. As quantity increases, the cost to the consumer rises much sharper than with uniformed metered rates.
Declining Block Rates

With the declining block rate, the price of water varies with the amount of water used. As consumption increases, the unit price declines with each successive consumption block. This method is based on the concept that rates should reflect the actual cost of providing service to the different levels of consumption. Among the metered systems, it is probably the most common method used. This block rate is usually coupled with a minimum charge for some quantity of water ranging from 1,500 to 3,000 gallons. This rate structure is based on the concept that costs decline as use increases, however small users may be penalized when the system faces investment costs. The minimum user will usually pay an unfair amount because the minimum charge is raised for the updating or construction of a new facility.

As quantity increases, the price per unit decreases. As quantity increases, the consumer pays more, but at a declining rate. This rate is the opposite of the increasing block rate.
SEWERAGE RATES

"Any upward adjustment of rates and charges for sewerage services shall not be granted solely on the basis of increases of rates and charges for water services, but shall be made only after a finding by the governing body that such an adjustment is reasonable and justified;" (TCA 7-35-414.)

The sewer rate structure is generally more difficult to devise because of the fact that the use of the system is not always metered, and the difficulty of treatment per customer is not always readily discernable. There are a number of rate structures that can be used in order to provide a fair system of calculating the use. Also, Federal Law mandates that an equitable system be used, with special emphasis on non-domestic users.

According to data from the Municipal Technical Advisory Service Profile 1982, there are 192 municipal sewerage systems operating in Tennessee that provide various degrees of sewerage treatment. The system charges vary from flat charges to a percentage of water consumption. A brief explanation will be given for some of the type of charges used.

Flat Rate Charge

The flat, or uniform rate is the simplest and easiest to establish. The charge for service is the same for each customer on the system. The flat charge appears to have been determined merely by setting a rate sufficient to produce the required amount of revenue. Many times this charge does not represent the amount to be paid for either the actual or presumptive use of the system, which results in unfair charges.
**Water Consumption Basis**

This method represents one fairly accurate measure of the use of the sewerage system, especially with residential customers, and results in a fair distribution of the costs. There are major variations of this form of rate, which include; metered water charges, combined water and sewer charges, and fixed percentage of the water bill.

1. **Metered Water Charges** - This method bills the consumer a charge based upon actual (metered) water usage. This is a fairly accurate measure. However, all water is not discharged into the sewer system, such as lawn sprinkling and car washing. This type of charge does not account for the fact that some customer's sewage is more expensive to treat than others.

2. **Combined Metered Sewer and Water Charges** - This form provides for only one charge to yield both water and sewer revenues. This form does provide for simplified billing procedures. However, in view of the fact that the water and sewer systems should be accounted for separately, the effort required to analyze and review the expenses and revenues outweighs the simplification of the billing system. As with metered water charges, this system does not take into account processing cost of sewage. Also, sales tax would be applied to the total bill, rather than to water only under this method.

3. **Fixed Percentage of Water Bill** - This method is a very common one throughout the county. This rate charge is established as a fixed percentage of the water bill, and is more equitable than any methods which are not based on water consumption. This system is simple to administer and bill, but has the disadvantage of the fact that if any inequity exists in the water bill, it is carried over into the sewer
Traditionally, sewer charges have been based solely upon the volume of wastewater discharged with an "economy of scale" discount given to large volume discharges. In recent years, it has become the trend to make an additional charge, usually called an "industrial waste surcharge," to dischargers of wastes with strength in excess of that of normal domestic sewage. However, the economy of scale discount on the basic sewer rental has, by and large, remained in effect.3

For those systems that have been built with Federal funds under the Federal Water Pollution Control Act, 1972, officially referred to as Public Law 92-500, they must break away from this traditional type of rate structure. The guidelines stipulate that all recipients of Federal funds must establish and implement an equitable sewer use charge system which results in the distribution of the cost of operation and maintenance of treatment works in proportion to a user's contribution to the total wastewater loading of the treatment works. Sewer users may be segregated into classes of users for purposes of allocating costs, such as; domestic users, dye manufacturers, food processing industries, etc. Each class would have similar wastewater characteristics.

This will not affect domestic user charges since it can be assumed that all domestic users will discharge a wastewater possessing similar strength and chemical characteristics. The domestic sewage can still be calculated solely by the volume of wastewater discharged since each user will pay in proportion to his total wastewater loading in accordance with E.P.A. requirements. This is so because the waste strength of all domestic users is assumed to be the same.

All nondomestic users with waste strengths in excess of those of domestic sewage must be handled on an individual basis. A formula must be set up to
place a surcharge on these nondomestic users for the extra costs needed to treat their sewage. 4

It should be reiterated that municipal sewage systems constructed with Federal Grants-In-Aid under Public Law 92-500 must place a surcharge that is equitable upon those commercial and industrial users whose waste strengths are in excess of the normal domestic sewage. This surcharge must be considered when developing a new rate structure for a sewage system.

Also, any sewerage systems constructed with federal money must also adhere to Public Law 35.2140, which addresses the user charge system. This law requires that each user pay a flat rate if federal money is used to finance any part of the sewage treatment system.

A portion of the law states: "A grantee's user charge system based on actual (or estimated) use of wastewater treatment services shall provide that each user (or user class) pay its proportionate share of operation and maintenance (including replacement) costs of treatment works within the grantee's service area, based on the user's proportionate contribution to the total wastewater loading from all users."

This law may limit the alternatives of rate structures that may be used for the sewerage system.

State Law requires that a rate structure be fair and equitable to all user classes and that the system must be self supporting. A number of considerations must be taken into account for both sewer and water rate structures in order to develop an equitable system.
OTHER RATE STRUCTURE CONSIDERATIONS

Classifications

There are many financial and political situations that have to be taken into account when developing the rate structure. The rate structure will reflect the type of community that is served by the utility.

For equity, most systems classify the consumers into groups, which can include:

- Single family residence
- Multiple family homes and apartments
- Small retail stores and small manufacturers
- Large commercial and large manufacturers

Many systems have different rates for each of the classifications, some may charge minimum rates by the size of the meter as well as by classifications. The logic behind this is that when a customer installs a larger meter, he demands more water, and the cost of providing this additional water immediately is greater.

Minimum Charges

Water must be available to the customer at all times whether the service is used or not. This service can be justified in the form of a minimum fee. A minimum fee should include a water allowance, but not so great a one as to promote waste. The minimum charge should be balanced by the number of users and the level of use versus the total cost of the system. The minimum charge should include a number of factors which include: a portion of the customer cost, base cost, extra capacity costs, and an element of capital costs. All of these cost factors should be included when developing the minimum charge.

Lifeline Rates
Many municipal utility systems serve a disproportionate number of elderly and low income users. The lifeline rate came into existence with the advent of the energy crunch. These rates are set on artificially low minimum costs. These rates have generally been applied to electric utilities, but several cities are using them to offer reduced rates on water and sewerage services. The lifeline rate is designed to provide the essential amount of water and sewerage service required to provide a healthy environment. Many argue that utility rates are not the proper vehicle for social programs, however with the "graying of America" this issue will be one that will continue to grow. This is another difficult decision that the policy makers must come to grips with.

Out of Town Customers

Should out of town customers pay more for water? That depends upon the situation. Most municipally owned water systems increase the price of water beyond the city limits. There are several justifications for this policy.

Many cities owning their own water and sewer utility financed the original plant as well as additions and improvements through general obligation bonds or general funds. Also, most revenue bond conveyances have the property tax mechanism for collateral in case of default. Therefore, the city residents are responsible for the system and have either paid for the system in the past through general obligation bonds or have revenue bonds issued with the credit of the municipality. This is a good argument for higher outside rates.

Another argument for higher outside rates is that the outside customers place greater peak load on the system thus requiring pumping and storage capacity and larger transmission mains.

A third argument is that most municipally owned utilities pay no local property tax, whereas private utilities do. TCA 7-34-115, "provides that
municipal utilities may make payment of tax equivalents to the city on property within the corporate limits not exceed what the taxes would be under private ownership." In most recent cases, if an in-lieu of tax is paid, it is far below what would be received if the utility was privately owned. The in-city customer of a city-owned utility must, through his property tax, make up the difference between the amount of tax the city would receive if the utility were privately owned, and what the city receives from its water utility in-lieu of taxes, or the total amount if the city-owned utility makes no payment in-lieu of taxes.

A fourth point for higher rates is the cost of extensions for the pipeline and the maintenance of the system. The higher outside rate can be justified by the avoidance of spreading the cost of the extensions over the total system.

Actually, the question is not if the outside user should pay more, but how much more should they pay.

All of the above mentioned items are usually taken into account when setting the rate structure. These items add to the complexity of setting a fair and equitable structure. Each affects a different customer group in the community, and some may overlap into two or more special customer categories. The decision makers know their community and their utility system, and if the major criteria for developing a good rate structure, (generating sufficient revenue; distributing the costs fairly across all user classes; developing a structure easily understood by the customer), are included in setting the structure, the community will have many of its utility problems solved.

The rate structure can be used to solve, or cause, many financial and political problems. Attention must be given to this all important area. Adequate time and study must be devoted in order for a utility system to insure fair and equitable charges, and more importantly, to maintain the proper quality for the health and safety of the community it serves.
Footnotes - Section II

Functions of a Utility Structure & Types of Rate Structures

SECTION III - SOURCES OF REVENUE
SOURCES OF REVENUE

It is the responsibility of the municipal administration to obtain the revenue needed to maintain proper quality service to all customers. In fact, in Tennessee it is the law.

"The governing body of a municipality . . . . shall prescribe and collect reasonable rates, fees or charges for the service, facilities and commodities of such public works, and shall revise such rates, fees or charges from time to time whenever necessary so that such public works shall be and always remain self-supporting. The rates, fees or charges prescribed shall be such as will produce revenue at least sufficient:

(1) To pay when due all bonds and interest thereon, for the payments of which such revenue is or shall have been pledged, charged or otherwise encumbered, including reserves therefore; and

(2) To provide for all expenses of operation and maintenance of such public works, including reserves therefore."

(TCA 7-34-114.)

This section will deal with various sources of revenue available to a municipal utility system operating in Tennessee.

Sale of Water

The sale of water constitutes the single major source of revenue to a system. The sale of water can be subdivided into the following categories:

1. Metered sales to customers
2. Unmetered sales
3. Bulk sales
4. Sales to public authorities
5. Sales to other departments

Metered sales account for the lion's share of water sold in most systems. Where meters are used, a maintenance system of replacing older meters should be in effect. The older the meter, the slower it will record usage, thus not all usage and revenue will be collected. The size of the meter should vary according to usage. If too small a meter is used for a large customer, all usage may not be properly recorded.

Many communities still have water service that is unmetered, however most are moving to a fully-metered system. If water is unmetered, a flat rate must be assessed each billing period. This system encourages waste and is not a fair means of measurement of usage.

Bulk sales occur usually in rural areas. A private hauler often contracts for bulk pick-up of water for resale to rural areas or for irrigation purposes. If water is sold to public authorities - utility districts - are very common. It is generally recognized that a municipality which chooses to bear this extra responsibility should charge a rate which would generate enough additional revenue to pay for additional capacity costs and to assure the continued service. Many utility districts have long term agreements as to the charges it will pay a municipality. Before a municipal utility agrees to service a utility district, all cost; past, present, and future, should be considered and built into the rate. If these costs are not built in, the municipality may be saddled with a long term obligation where it is providing water at prices less than the cost of production.

Sales to other city departments may seem as though the city is "Robbing Peter to pay Paul"; however, sound fiscal practice requires that actual revenue
and expenses incurred by each department be determined. This may be a minimal revenue but an important one nonetheless.

The sale of water is the primary source of revenue for a water utility system; however, there are a number of other revenue sources that must be taken into account. Some of these other sources will now be discussed.

Penalties & Forfeited Discounts

This source of revenue is primarily designed to encourage collection and not used as a source of revenue. However, funds are generated in this manner. The most common practice and policy in this area is to quote both a net figure and a gross amount, with the gross amount becoming payable usually ten days after the billing date. The discount for prompt payments should be in relation to the costs it is designed to save, such as collection expense and loss of interest on uncollected funds, as well as additional accounting expense. 2

Installation Charges - Tap Fees

Most systems charge the new customer for connecting service, a charge usually designed to meet the costs of installing the meter and related costs. This is a one-time charge which may vary with meter or service size, and it may be predetermined based on average costs or may vary with the actual cost incurred in the connection.

If the cost of making the tap is expensed when incurred, the installation charge, or tap fee is recognized as a revenue. If the tap fee is considered to have increased the value of the system and is capitalized, then the installation charge or tap fee is recognized as a capital contribution rather than a revenue.
Sale of Material & Supplies

Many utility systems own equipment and material that is not readily available to the general public. Many times excess or obsolete material is sold at a public auction in order to generate revenue for the utility.

Fire Protection Charges - Hydrant Rental

Many systems in Tennessee charge the General Fund of the City a fee for fire protection. Fire protection costs have no relation to the amount of water used. These costs include the capital costs for the portion of the distribution system, including storage, over and above that required to provide service to the customers as well as maintenance costs for the same portion.

Benefits realized from fire protection service in the form of reduced insurance premiums are directly proportional to the value of the property protected. Therefore, the cost of public fire protection should be borne by the property protected. One way this can be accomplished is for the municipality to pay the water utility the cost of public fire protection out of general government funds and add this amount to the property tax.

According to the Municipal Technical Advisory Service Profile, there are 219 municipally owned water systems in Tennessee. Only 57 of these charge any type of hydrant rental fee. These fees range from a flat fee to charges per hydrant. The Columbia, Tennessee water utility received over $45,000 in 1981-1982. The City of Morristown, Tennessee charged a fee of $15 per hydrant.

The rental charge should be determined by the additional cost to the system as a result of the fire protection capabilities, and an estimate of the treated water used for fire protection.

The fire protection fee, (hydrant rental) is a very important source of revenue that many cities in Tennessee are failing to use.
Miscellaneous Sources

Some larger utility systems sell their management techniques or engineering services. Other systems may own more land than their present needs call for. This asset can be leased or sold. Office space can also be leased to outside interests. Many other innovative approaches are used throughout the country.

Miscellaneous Charges

Many utilities place charges on services such as; repair trip charge, meter repair charge, meter test charge, and service connection charge. These charges generate very little revenue, but they do provide a means to discourage abuse of the system.

Customer Deposits

It is a customary practice in public utility operations to require customers to make deposits at the time of connection to the utility system, these deposits being designed to insure payment of final statements and to protect the utility against damage to equipment located on the customers' property. When a customer requests withdrawal from the system, his deposit is refunded, less the amount of any charge which may be outstanding against his account. While in the possession of the utility, customers' deposits constitute restricted assets which are not available for the financing of current utility operations.³

Some cities are now eliminating customer deposits and instead are charging a non-refundable charge for new customers.
Non-Operating Revenue

The major source of non-operating revenue is interest generated from temporary investments of Water and Sewer funds. Many systems supplement their operating income with these interest earnings. An aggressive investment program should be implemented for all municipal funds.
CAPACITY CHARGES

Capacity charges are used to recover the cost of investment in major system components such as transmission, pumping, treatment, and source of supply facilities for new customers. These charges are one time charges usually, and can not be considered an operating revenue.

There are a number of alternatives that can be used to recover these costs. These include extension fees, connection charges, acreage fees, and availability charges.

Most Tennessee systems use the connection charge, (tap fees); however, the other alternatives are available in addition to the tap fees.

- Extension fees - would require new customers to pay for the full costs of extending mains and related facilities. If the main had to be oversized to meet future growth, the new customer would be required to pay only a proportionate share. Customers later connecting to an oversized extension would also be required to reimburse the utility for their proportionate share.
- Availability Charge - is designed to recover a proportionate share of the costs from each customer on the basis of the customer's expected demand, as indicated by meter capacity.
- Acreage fees - These fees are assessed on the basis of acreage at either a single rate for all customers or at different rates depending on land use; these fees are used to recover costs associated with major transmission facilities.

Capacity charges are becoming more popular as cost of capital equipment continue to spiral. These charges must be tailored to the conditions of the specific utility. This source of revenue is one that needs to be developed more fully.
Use of Revenues

According to Tennessee Law, (7-340115), any surplus of funds, after proper reserves have been established, must be devoted to the reduction of rates. If all bonds issued to finance any part of the system have been retired, the surplus in revenues may be used for any municipal purpose, provided no contractual obligations are violated.

Also, the general fund of a city is allowed to charge the utility system a fee not to exceed six percent (6%) per year of the equity or investment of the utility. A payment of in lieu of ad valorem tax on the property within the corporate limits may be charged the utility. (A copy of TCA 7-34-115 can be found in the appendices.)

The following section will deal with the types of expenses faced by utility systems.
Footnotes - Section II

Revenue Sources

SECTION IV - UTILITY EXPENSES
UTILITY EXPENSES

Just as with any enterprise, the utility system incurs a number of costs to provide adequate service, and to assure maintenance and development of the system. These expenditures can be classified as operating and non-operating expenses.

Operating Expenses

The types of operating expenses may vary slightly with each individual utility, (water & sewer) system, but for the most part, delivering the product consists of the basic elements for all systems. The following will list the more common types of operating expenses incurred by the utility system - just in case you are looking for another way to spend your revenues.

- Administrative
- Engineering
- Accounting and Collections
- Plant Maintenance
- Reservoirs and Source of Supply
- Purification
- Water Pumping
- Water Distribution
- Sewer Lines
- Sewage Pumping
- Sewage Treatment
This list includes the basic classifications of expenditure items. Each of these classifications contain a number of itemized expenses, which are usually contained in the audit.

A separate explanation of these expenditure items will not be offered. However, sound management practice dictates that each of the expenditure items should be reviewed and cost reduction measures should be implemented wherever possible.

Depreciation

An operating or non-operating expense? Some authorities recommend that depreciation be recognized as a non-operating expense since it does not require an annual cash outlay. However, in accounting for depreciation, the cost of a fixed asset, less any salvage value, is pro-rated over the estimated service life of such an asset, and each period is charged with a portion of such cost. Through this process, the entire cost of the asset is ultimately charged off as an expense.1

Since depreciation accounting consists of charging off a pro-rated part of the cost of the fixed assets of the utility system to annual operations, and depreciation is regularly charged as an operating revenue deduction in many audits, then it follows that depreciation must be included in any rate determinations.

Although depreciation is not a cash outlay, including it in a rate determination will help offset payments of loan principal which is a cash outlay.

If your city does not have a depreciation schedule on hand, one may be obtained from the city's auditor.
In Lieu of Taxes

As stated in the previous section on the use of revenue, TCA 7-34-115 allows the governing body of the municipality, "by resolution, to require payments to the municipality in lieu of ad valorem tax on the property of the public works within the corporate limits of the municipal not to exceed the amount of taxes payable on privately owned property of similar nature."

According to the Municipal Technical Advisory Service 1982 Profile, only seven water systems pay an in lieu of tax to the municipality that operates it.

The municipality may also charge a fee not to exceed six percent (6%) per year of the equity or investment of the utility.

Interest Expenses

The interest paid upon bond obligations is classified as a non-operating expense. This expense is usually paid out of the debt service fund. Any fiscal agent fees are usually paid from this fund, and are also classified as a non-operating expense. This expense must be included in developing a rate schedule.

Capital Outlays

The procurement of capital items is usually not included in rate schedule development because a utility normally purchases the asset with another asset, cash. These capital outlay costs will be absorbed through depreciation in subsequent years.
SERVICING REVENUE BOND ISSUES

Most utility systems have been built and financed through the issuance of revenue bonds. These bonds are "payable solely from the revenues derived from charges collected for services rendered by the system, . . . . and shall not constitute an indebtedness of such city or town within the meaning of any legal limit in indebtedness. (TCA 7-35-426.)

Revenue bonds cannot be issued exceeding forty (40) years. (TCA 7-35-423.) Most issues have provisions included which call for setting aside a set amount of cash to insure the prompt payment of the interest and annual principal. State Law, (TCA 7-35-430.) allows cities and towns to establish such funds by ordinance and to "definitely fix and determine the amount of revenue which shall be necessary."

Under the typical revenue bond indenture for a municipal utility, the indenture will first specify a Revenue Fund which is to receive all income from all sources arising out of the utility's operation.

After operating and maintenance expenses have been met from the Revenue Fund, the debt service accounts must be funded from the "Net Revenue." Actual debt service payments have priority over operating and maintenance cost. The debt service must be funded first. Net revenues for debt service purposes in revenue bond ordinances are usually defined as gross operating revenues, less operating and maintenance expense, but exclusive of depreciation and bond interest. There are basically three typical funds set up to retire and service revenue bond issues. These funds include: (1) Debt Service or Sinking Fund; (2) Reserve Fund; and (3) Contingencies Fund. All of these are restricted funds.
Debt Service Fund

The first of these restricted funds, the Debt Service Fund, is variously called the "Interest and Sinking Fund," the "Bond and Interest Fund," or the "Interest and Redemption Fund." The purpose of this fund is to accumulate cash with which to make principal and interest payments on outstanding revenue bonds. A typical bond issue will call for interest payments on a semi-annual basis and an annual payment for principal. A monthly amount should be deposited into this fund to cover these payments. The monthly payment should consist of an amount equal to one-twelfth of the next annual principal maturity and one-sixth of the next maturing semi-annual interest payment. The fund should be reimbursed for bank charges paid. This formula will insure that adequate funds are set aside to meet these obligations.

Reserve Fund

The second restricted fund is called the Reserve Fund. Its purpose is to pay matured bonds and interest in the event of a deficiency in the primary Debt Service Fund. This fund is usually accumulated over the first five years following the issuance of a revenue bond. The total amount to be accumulated in this fund varies, but it is usually an amount equal to the maximum annual debt service. Under normal circumstances the balance in this fund will not be used until the final retirement of the bond issue. The balance should be invested until needed. Some bond ordinances call for all interest earnings on this fund to be credited to the fund from which the investment was made.

Contingency Fund

The third fund usually called for in the revenue bond issue is the Contingency Fund. This fund is designed to provide cash for meeting unforeseen
operating expenditures or for renewals and replacement of assets. It is usually accumulated in a specific number of months following the bond issuance until it has reached a level called for in the ordinance.

There may be additional funds that may be called for by the bond ordinance; however, most bond issues will establish one or more of the above mentioned funds. Again, the balances of these funds should be invested until needed in order to provide maximum revenue for the utility.
Footnotes - Section IV

Utility Expenses

1. "Governmental Accounting, Auditing, and Financial Reporting"
   National Committee on Governmental Accounting, June 1978.
2. Ibid.
SECTION V - THE RATE STUDY
THE RATE STUDY

This section will focus upon the operations necessary to determine if a new, or an updating of the existing utility rate structure is needed; and if so, the means used to establish a new rate. A 'case study' format will be used to provide an example of the flow of these various operations.

Steps Used In Rate Study

A. Fiscal Review
   1. Gather historical financial data
      a. Audit Reports
      b. Budget and other financial documents
   2. Project Revenues and Expenditures
      a. Determine need for rate increase
      b. Analysis of future needs
      c. Determine amount of rate adjustment needed

B. Calculation of Rate Adjustment
   1. Develop Consumption Chart
   2. Determine Consumer Groups

C. Set New Rate Structure
   1. Substitute proposed rate in place of current rate
   2. Set rate categories by usage

D. Recommendations of the Rate Study
   1. Cost Saving Measures
   2. Alternative Revenue Sources
FISCAL REVIEW

Too often, municipal systems are forced to operate on budgets based solely on anticipated revenues and antiquated rates. This practice inevitably leads to poor maintenance, negligible system improvements, and eventually hefty rate increases just to maintain current operations. Periodic review and adjustments are needed to prevent these problems. Again, the major question is, "How often and to what degree should rates be raised?" There are arguments for and against frequent but small rate increases, as opposed to large but rare increases. This is a political question that must be left to the decision makers; however, a review of the total system should be conducted very frequently so the decision makers will have the necessary information in order to make the decision as to "frequency and degree" of rate charges.

Prior Experience

The first step in a water rate study is to look to the past to determine whether or not the rates have historically been adequate to support the system. An accurate examination of past revenue and expenditures determines trends that can be projected into the future.

The historical information should always be obtained from audited figures. This practice not only assures accuracy, but provides documentation in case the study is contested. This is particularly important for those systems which serve outside utility districts.

Historical data should be compiled over a three to five year period and should be presented in a form with each year placed in a separate column so that one year can be compared with another. This will help in determining trends.

Operating revenue should be separated from non-operating revenue. The same holds true for operating and non-operating expenses.
Columns for estimated and projected revenues and expenses should be provided.

The following table will show a sample format:

(Note: An example showing cash profit and net earnings is offered in the appendices.)
## TABLE I

Revenues and Expenditures Comparison

<table>
<thead>
<tr>
<th></th>
<th>Actual 19X1-X2</th>
<th>Actual 19X2-X3</th>
<th>Actual 19X3-X4</th>
<th>Estimated 19X4-X5</th>
<th>Projected 19X5-X6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Revenues</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Sales</td>
<td>200,000</td>
<td>205,000</td>
<td>210,000</td>
<td>210,000</td>
<td>210,000</td>
</tr>
<tr>
<td>Sales to Utility District</td>
<td>50,000</td>
<td>45,000</td>
<td>55,000</td>
<td>50,000</td>
<td>50,000</td>
</tr>
<tr>
<td>Service Charges</td>
<td>5,000</td>
<td>4,000</td>
<td>4,500</td>
<td>4,500</td>
<td>4,500</td>
</tr>
<tr>
<td>Material &amp; Supplies</td>
<td>2,500</td>
<td>3,000</td>
<td>1,000</td>
<td>1,000</td>
<td>1,000</td>
</tr>
<tr>
<td>Hydrant Fees</td>
<td>2,500</td>
<td>2,500</td>
<td>2,500</td>
<td>2,500</td>
<td>2,500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>260,000</td>
<td>259,500</td>
<td>273,000</td>
<td>268,000</td>
<td>268,000</td>
</tr>
<tr>
<td><strong>Operating Expenses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salaries</td>
<td>52,000</td>
<td>54,000</td>
<td>56,000</td>
<td>58,000</td>
<td>58,000</td>
</tr>
<tr>
<td>Power for Pumping</td>
<td>30,000</td>
<td>32,000</td>
<td>38,000</td>
<td>42,000</td>
<td>44,000</td>
</tr>
<tr>
<td>Chemicals</td>
<td>18,000</td>
<td>19,000</td>
<td>22,000</td>
<td>25,000</td>
<td>25,000</td>
</tr>
<tr>
<td>Maintenance</td>
<td>15,000</td>
<td>18,000</td>
<td>21,000</td>
<td>24,000</td>
<td>25,000</td>
</tr>
<tr>
<td>Accounting &amp; Office</td>
<td>10,000</td>
<td>10,000</td>
<td>11,000</td>
<td>12,000</td>
<td>12,000</td>
</tr>
<tr>
<td>Depreciation</td>
<td>50,000</td>
<td>55,000</td>
<td>60,000</td>
<td>65,000</td>
<td>70,000</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>2,000</td>
<td>2,500</td>
<td>3,000</td>
<td>3,500</td>
<td>3,500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>177,000</td>
<td>190,500</td>
<td>211,000</td>
<td>229,500</td>
<td>237,500</td>
</tr>
<tr>
<td>Operating Income</td>
<td>83,000</td>
<td>69,000</td>
<td>62,000</td>
<td>38,500</td>
<td>30,500</td>
</tr>
<tr>
<td>Other Income (interest)</td>
<td>10,000</td>
<td>10,000</td>
<td>12,000</td>
<td>12,000</td>
<td>12,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>93,000</td>
<td>79,000</td>
<td>74,000</td>
<td>50,500</td>
<td>42,500</td>
</tr>
<tr>
<td><strong>Non-Operating Expenses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest</td>
<td>55,000</td>
<td>58,000</td>
<td>58,000</td>
<td>60,000</td>
<td>60,000</td>
</tr>
<tr>
<td>Engineering Study</td>
<td>15,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NET EARNINGS</strong></td>
<td>38,000</td>
<td>6,000</td>
<td>16,000</td>
<td>(9,500)</td>
<td>(17,500)</td>
</tr>
</tbody>
</table>
The historical data shows that this utility system is in need of a rate increase. The revenues have become stagnant while expenditures have continued to spiral.

Most financial problems do not develop suddenly; however, if the fund is not monitored properly, it may seem as though the problem appeared overnight.

Three major factors should be considered in monitoring and evaluating the financial condition. These include:¹

- Financial Factors
- Environmental Factors
- Organizational Factors

Financial Factors

These factors reflect the condition of the utility's internal finances. Using the above example (Table I) of the historical data chart, it can be determined that revenues have remained constant, (have actually declined in real value), and expenditure pressures have increased, in particular power for pumping and maintenance costs. Also, net cash has continually declined and budgetary surpluses have long been expended. In addition, the capital plant is eroding and interest expenses are growing. All of these factors point to growing financial problems.

The financial factors all point to a need for a rate increase. Given just these financial factors, it can be seen that a rate increase of over seven percent (7%) is needed to bring income up to meet the projected expenses. Yet, this does not take into account any other factors. The seven percent (7%) increase would meet the need, provided all things remained constant. This increase amount was derived from the following:

40
Projected Revenue - All Sources  280,000
Projected Expenses  297,000
               (17,000)

Additional revenue of over $17,000 is needed to cover the current expenses. If a seven percent increase in rates is applied to the amount of water sold, this would produce an additional $18,200.

$26,000 (water sold) x .07 = $18,200

It is important to remember that the rate increase is applied only to the amount of water sold and not the total revenue amount. In our example, the total revenues equal $180,000, yet $260,000 is the amount of revenue generated from the water sales, and is the figure that must be used when deriving the final total.

The increase of seven percent would be sufficient to cover all current expenses in this example; however, other constraints come into play. In addition to financial factors, environmental and organizational factors must be monitored to effectively chart the financial condition of the utility.

Environmental Factors

The environmental factors affect the decision in a number of ways. These factors include: community needs and resources, economic conditions, political attitudes, intergovernmental constraints, and disasters and emergencies.

Before a rate structure is developed, the decision makers must have a thorough knowledge of the community and the customers linked to the system. They must also be aware of constraints placed by Federal and State mandates and restrictions placed by Grants-In-Aid.
The economic conditions of the local area as well as local political attitudes toward taxes and services usually have a bearing on the financial condition.

Using the example in Table I, the seven percent (7%) raise in rates would not be enough if a matching grant had to be met in the near future or if inflation was calculated to be at a high level. If there is knowledge of a significant population change or the change in large industrial or commercial users, the future financial condition will be affected.

Environmental factors may create demands, provide additional resources, establish constraints, or do a combination of all. If environmental factors provide enough additional resources to pay for the additional demands they make, then a positive situation exists; if more demands than revenue are caused by environmental factors, then the situation must be rectified to provide a positive condition.

Organizational Factors

The organizational factors are the responses the utility makes to changes in the environmental factors. To remain in good financial condition, the utility must make proper responses to adverse conditions by increasing efficiency, raising rates, increasing revenue sources, or taking some other appropriate action.

In the case (Table I) of the aforementioned example, the decision makers must weigh all the external, as well as internal constraints before setting the final policy as to the rate increase.

Completing the first step, gathering historical data, is not limited to only financial data, but must include gathering data on all aspects of the
system. This is a prerequisite to the second step of the water study evaluation, projecting revenue and expenditures.

PROJECTING REVENUE AND EXPENDITURES

The second step in the preparation of a rate study is projecting revenue and expenditures. When projecting revenue and expenditures, the historical information gathered from the audit reports should be used. This historical data will enable you to determine average rates of growth from past years that can be helpful in producing estimates for future years.2

Continuing with the example, (Table I), and applying the average annual rate of growth to revenues and expenditures can be determined as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue</th>
<th>Rate of Growth</th>
<th>Expenditure</th>
<th>Rate of Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>270,000</td>
<td>-</td>
<td>232,000</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>269,500</td>
<td>-0.1%</td>
<td>263,500</td>
<td>12%</td>
</tr>
<tr>
<td>3</td>
<td>285,000</td>
<td>6%</td>
<td>269,500</td>
<td>3%</td>
</tr>
<tr>
<td>4</td>
<td>270,000</td>
<td>-5%</td>
<td>289,500</td>
<td>7%</td>
</tr>
</tbody>
</table>

Average Rate of Growth for Revenue = 0%
Average Rate of Growth for Expenditures = 7%

The example above shows that revenues have been fluctuating only in year 3, while averaging out to a Zero Growth over the four year period. Meanwhile, expenditures have increased an average of over seven percent (7%) for the past four years. If this is to be projected a few years into the future one can easily predict that the utility will soon be in dire straits and is in need of an immediate rate increase.
Fluctuations in revenue and expenditures should be thoroughly researched and explanations should be given to any significant change. A thorough understanding of the reasons for the rate growth, (or decline), is essential when preparing a rate structure.

Projecting Expenditures

Expenditures should be fairly easy to project barring any unforeseen emergency or disaster. The bond and interest requirements should be set for years in advance, as well as all payments to reserve and depreciation funds. Allowances for depreciation should be known by taking the yearly allowance set by the auditor and applying it to the expenses. Future capital expenditures should be planned out in advance so they may be anticipated.

Future growth costs, and Federal and State mandates are sometimes difficult to plan for and can cause added expenses that had not been projected. These include higher water and wastewater standards that result in more qualified (and expensive) personnel, added equipment and maintenance costs, and increases to operating cost down the line.

However, expenditures can normally be accurately projected for a reasonable period of time by reviewing historical data and being aware of current developments in the community.

Projecting Revenues

All possible revenue sources should be utilized to their full potential before a rate increase is put into place. With most systems, the largest source of revenue is the sale of water - sewer service. Unless a spurt in population takes place or some other event that would cause the amount of water sold to increase significantly, water sales revenue will remain fairly constant.
Historical data can be used to project revenues in the manner illustrated in Table II. Given the constant rate charges, this means of projection should be fairly accurate.

Again, a thorough knowledge of the community and an awareness of any anticipated major changes in the number and type of customers linked to the utility system is essential in projecting revenues.
A basic element of the rate study is the consumption category review. This review enables one to determine how each consumer group(s) is affected by a rate increase. It also determines what percentage of revenue is derived from each group. This table helps answer questions such as: "Does most of the revenue come from the minimum user?", or; "Is industry providing a majority of the revenue?"

By developing a consumer use chart, a utility can more readily tailor its rate structure, and can be aware of the extent that each group of consumers will be affected by a rate change.

Examples of user charts and consumption categories along with explanations in developing these charts can be found in Table III and Table IV. The basic data used to develop these charts is gathered from the billing records and the current rate structure. Simple calculations are made from this data to provide the needed information. An explanation of each table follows.
### TABLE III

<table>
<thead>
<tr>
<th>Average Gallons/Month</th>
<th>Number Customers</th>
<th>Rate</th>
<th>Revenue Per Month</th>
<th>Annual Revenue</th>
<th>Percentage of Total Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum - 2,000</td>
<td>567</td>
<td>4.00</td>
<td>2,268</td>
<td>27,216</td>
<td>12%</td>
</tr>
<tr>
<td>3,000</td>
<td>212</td>
<td>6.00</td>
<td>1,272</td>
<td>15,264</td>
<td>7%</td>
</tr>
<tr>
<td>4,000</td>
<td>175</td>
<td>7.30</td>
<td>1,277</td>
<td>15,330</td>
<td>7%</td>
</tr>
<tr>
<td>5,000</td>
<td>140</td>
<td>8.60</td>
<td>1,204</td>
<td>14,448</td>
<td>6%</td>
</tr>
<tr>
<td>6,000</td>
<td>120</td>
<td>9.90</td>
<td>1,188</td>
<td>14,256</td>
<td>6%</td>
</tr>
<tr>
<td>7,000</td>
<td>100</td>
<td>10.90</td>
<td>1,090</td>
<td>13,080</td>
<td>6%</td>
</tr>
<tr>
<td>8,000</td>
<td>80</td>
<td>11.90</td>
<td>952</td>
<td>11,424</td>
<td>5%</td>
</tr>
<tr>
<td>50,000</td>
<td>3</td>
<td>40.00</td>
<td>120</td>
<td>1,404</td>
<td>1%</td>
</tr>
<tr>
<td>245,000</td>
<td>2</td>
<td>100.00</td>
<td>200</td>
<td>2,400</td>
<td>1%</td>
</tr>
<tr>
<td>1,000,000</td>
<td>1</td>
<td>400.00</td>
<td>400</td>
<td>4,800</td>
<td>2%</td>
</tr>
<tr>
<td><em>Others between 8,000-50,000</em></td>
<td>500</td>
<td>----</td>
<td>7,500</td>
<td>90,000</td>
<td>42%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Grand Total</th>
<th>1,900</th>
<th>17,471</th>
<th>209,652</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility District</td>
<td>1</td>
<td></td>
<td></td>
<td>50,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>259,652</td>
<td></td>
</tr>
</tbody>
</table>

The groups between 8,000 and 50,000 were combined to save space in this example.
The tables are broken off from 8,000 to 50,000 gallons in order to save space. All consumer groups should be listed in the development of a user chart.

The consumer use chart should include data from a period of twelve (12) months. However, if this method is impractical, sample months should be chosen to represent each season. Fluctuations in consumption occur frequently between seasons, and this should be taken into account.

Table III contains six columns. Column One, Average Gallons per month is taken from billing records of the past year and is averaged out. An example of this would be if a customer used 2,000 gallons or less for ten months and happened to use 3,000 for two months, the average would place the customer in the minimum - 2,000 gallon category. Many monthly billing documents will total the customers by usage. If this method is not available, a tally sheet can be used to group the users. If water is measured by cubic feet, this measurement can be interchanged with the gallons per month in Column One.

Column Two, Number of Customers, should also be average over the time period included in the study, (normally one year). If 500 customers use 2,000 gallons January through June, and 100 customers use 2,000 gallons July through December, the average number of customers for 2,000 gallons would be 550.

Column Three, the Rate, is taken from the rate in effect per thousand gallon increment.

Column Four, Revenue Per Month, is the product of Column Three, rate charged, multiplied by Column Two, number of customers. This formula is used for each increment.

$$567 \text{ customers x } $4.00 = $2,268$$

Column Five, Revenue Per Year, is the product of Column Four, revenue per month multiplied by 12.

$$2,268 \times 12 = $27,216$$
Column Six, Percentage of Total Revenue, is taken from the grand total of revenue and divided by each increment in Column Five.

Customers Using 2,000 gallons provide 12% of the revenue.

\[ \frac{27,216}{209,652} = 12\% \]

This chart is simple to develop and is a very important ingredient of the rate study.

Again, the data used to construct Tables III and IV can be gathered from the billing records of the utility. The usage of each customer can easily be averaged out and the rate can be applied to each group. Simple calculations are then used to provide the additional information.
<table>
<thead>
<tr>
<th>Ave. Gallons Per Month</th>
<th>Number of Customers</th>
<th>Percentage of Customers</th>
<th>Percentage of Total Consumption</th>
<th>Gallons Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,000 - minimum</td>
<td>567</td>
<td>29%</td>
<td>7.8%</td>
<td>1,134,000</td>
</tr>
<tr>
<td>3,000</td>
<td>212</td>
<td>11%</td>
<td>4.4%</td>
<td>636,000</td>
</tr>
<tr>
<td>4,000</td>
<td>175</td>
<td>9%</td>
<td>4.8%</td>
<td>700,000</td>
</tr>
<tr>
<td>5,000</td>
<td>140</td>
<td>7%</td>
<td>4.8%</td>
<td>700,000</td>
</tr>
<tr>
<td>6,000</td>
<td>120</td>
<td>6%</td>
<td>5.0%</td>
<td>720,000</td>
</tr>
<tr>
<td>7,000</td>
<td>100</td>
<td>5%</td>
<td>4.8%</td>
<td>700,000</td>
</tr>
<tr>
<td>8,000</td>
<td>80</td>
<td>4%</td>
<td>4.4%</td>
<td>640,000</td>
</tr>
<tr>
<td>*</td>
<td>500</td>
<td>26%</td>
<td>52.1%</td>
<td>7,500,000</td>
</tr>
<tr>
<td>50,000</td>
<td>3</td>
<td>---</td>
<td>1.0%</td>
<td>150,000</td>
</tr>
<tr>
<td>145,000</td>
<td>2</td>
<td>---</td>
<td>3.4%</td>
<td>490,000</td>
</tr>
<tr>
<td>1,000,000</td>
<td>1</td>
<td>---</td>
<td>6.9%</td>
<td>1,000,000</td>
</tr>
<tr>
<td></td>
<td>1,900</td>
<td>100%</td>
<td>100%</td>
<td>14,370,000</td>
</tr>
</tbody>
</table>

*8,000 - 50,000--Average of 15,000 gallons for each customer in this group. For example only.*
Table IV shows relationships between the group consumption and, (1) the percentage of total consumption, (2) the total consumption and, (3) the percentage of total customers.

Column One and Column Two, (average gallons per month and number of customers), are derived the same way as explained for Table III.

Column Three shows the percentage of customers for each consumption group. This is the quotient of each increment in Column Two divided by the total number of customers.

\[
\frac{567}{1,900} = 29\%
\]

Twenty-nine percent of all customers in this example use the minimum amount of water.

Column Five is the produce of Column One multiplied by Column Two.

\[
2,000 \text{ gallons} \times 567 \text{ customers} = 1,134,000 \text{ gallons}
\]

This procedure is carried out for each group consumption. The totals in Column Five show that 14,370,000 gallons of water is sold per month.

Column Four is derived by dividing the consumption used in each group by the total consumption.

\[
\frac{1,134,000}{14,370,000} = 7.8\%
\]

These tables can be used to determine which group of users provide the longest share of revenue as well as which group is the greatest consumer.

Data from Tables III and IV show that the minimum user provides 12% of the revenue while consuming 7.8% of the water sold. Also it can be pointed out that 40% of all customers use 3,000 gallons or less. The large industrial user
provides 2% of the revenue while using seven percent (7%) of the water produced. Information such as this is helpful in determining if the existing rate structure is equitable.

These tables offer a great deal of information and are very important in the development of a rate structure.

It is also important to use these charts when substituting the new rate. The new rates can be substituted in Table III, Column Three, and the calculations for Columns Four and Five can easily be derived. This will be discussed in the following section.
Setting The New Rate

In our example, the revenues and expenditures have been projected on the basis of historical data shown in Table I, and the projections included in Table II.

The projections show that revenues are not growing and expenditures are expected to exceed revenues by seven percent (7%) in the upcoming year. A seven percent rate increase will meet expenditure needs for the current year; however, this increase will not generate enough revenue for the upcoming year.

Once again we come to the question of "How often, and to what degree should rates be raised?"

We will assume that the decision makers, after weighing the financial, environmental, and organizational factors, have decided to raise rates by fifteen percent (15%) across the board.

The current projection of water sales is $260,000. A 15% increase will raise this amount to $229,000. When other revenue sources are added to this amount the total is $319,000. This increase will provide a balance of around $20,000 for the upcoming year.

Again, we will use the consumption tables to determine what effect the increase will have on the individual consumption categories. A sample is shown on the following page. The new rate is substituted in Column Three in place of the current rate. (Current rate x 15%)
TABLE V
New Rate - Consumption Table

<table>
<thead>
<tr>
<th>Average Gallons</th>
<th>Number of Customers</th>
<th>New Rate</th>
<th>Monthly Revenue</th>
<th>Annual Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,000</td>
<td>567</td>
<td>4.60</td>
<td>2,608</td>
<td>31,298</td>
</tr>
<tr>
<td>3,000</td>
<td>212</td>
<td>6.90</td>
<td>1,462</td>
<td>17,553</td>
</tr>
<tr>
<td>4,000</td>
<td>175</td>
<td>8.39</td>
<td>1,468</td>
<td>17,619</td>
</tr>
<tr>
<td>5,000</td>
<td>140</td>
<td>10.70</td>
<td>1,498</td>
<td>17,976</td>
</tr>
<tr>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50,000</td>
<td>3</td>
<td>46.00</td>
<td>138</td>
<td>1,656</td>
</tr>
<tr>
<td>245,000</td>
<td>2</td>
<td>115.00</td>
<td>230</td>
<td>2,760</td>
</tr>
<tr>
<td>1,000,000</td>
<td>1</td>
<td>460.00</td>
<td>460</td>
<td>5,520</td>
</tr>
<tr>
<td>Totals</td>
<td>1,900</td>
<td></td>
<td>20,125</td>
<td>241,500</td>
</tr>
<tr>
<td>Utility District Sales</td>
<td></td>
<td>4,790</td>
<td>57,500</td>
<td></td>
</tr>
<tr>
<td>Grand Total</td>
<td></td>
<td></td>
<td>24,915</td>
<td>299,000</td>
</tr>
</tbody>
</table>

*omitted for Space

Again, this is a simplified example given for illustrative purposes; however, all of the major components of the rate study have been included in this example.

This example assumed that the present rate structure was a fair system and that no modification was needed except for the upward movement of the rates by fifteen percent (15%).

The new rate structure provides $299,000 from water sales, whereas the old rate system provided $260,000. The fifteen percent (15%) rate increase provided $39,000 in additional revenue. The projected deficit of $17,000 should be
erased and a surplus of $18,000 ($39,000 less $17,000) should exist for the upcoming year.

It should be pointed out that when a new rate becomes effective, consumption sometimes drops as much as ten percent (10%) for a few months. This will affect the projected revenue in a negative manner. Also, it takes a few months from the time the rate is passed and the time the new revenue is realized. This point should also be taken into consideration.

It is important to remember that the rates could be structured in a number of ways other than an across the board increase. The ultimate goal is to raise the additional revenue to cover all expenses. In this example, a revenue increase of over $20,000 was immediately needed. The fifteen percent (15%) across the board increase provided this amount plus a small cushion for future use.

The consumption charts can be used to calculate changes in rate structures to a specific user group.

Suppose the board members felt that the minimum charge should not be raised the proposed fifteen percent (15%), and should remain at $4.00. The amount of revenue lost by the action would have to be provided from the larger consumer groups. In order to determine how much revenue would have to be made up, the following method can be used to calculate the approximate amount. The consumption chart data can be used once again.

<table>
<thead>
<tr>
<th>Gallons</th>
<th>Number of Customers</th>
<th>Proposed New Rate</th>
<th>Twelve Months</th>
<th>Yearly Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,000</td>
<td>567</td>
<td>4.60</td>
<td>12</td>
<td>$31,298</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Current Rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,000</td>
<td>567</td>
<td>4.00</td>
<td>12</td>
<td>$27,216</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Difference</td>
<td></td>
<td>$4,082</td>
</tr>
</tbody>
</table>
This calculation shows that the utility would lose over $4,000 if the minimum user charge remained at the current level.

$$567 \text{ Customers} \times \text{Rate} \times 12 = \text{Yearly Revenue}$$

Different rates can be substituted for each user class in the consumption chart. This allows for adjustments within the rate structure, yet the final objective is to raise "X" amount of dollars that has been projected to be needed.

Again, the revenue difference should be made up by charging higher amounts to the heavier consumers. The consumption table is invaluable in providing the type of information needed to determine the rate structure.

A consumption table can be prepared for sewer users in the same manner. Some differences would exist in preparing the consumption column, depending on the manner in which the sewage usage is billed. The same applications used for the water consumption can be used for the sewer consumption usage chart.

Although a rate increase may not be needed annually, it is a good idea to have a yearly review of the rate system and the financial picture of the utility. This review should be held in conjunction with the yearly budget process.
To summarize the 'case study' example; it was determined by the use of historical data that revenues were not meeting expenses. Table I, compared revenues and expenditures for the preceding three years and projected a year into the future. The projection showed a loss of ($17,500).

An example was given to show that a fifteen percent (15%) increase in water rates was needed to meet the current expenditure amount. This was taken from data on Table I. The fifteen percent (15%) was applied only to water sales which would increase revenue by $39,000. This amount would more than offset the projected loss of ($17,500).

Table II showed that revenues had a zero growth while expenditures climbed by seven percent (7%) per year. This data was accumulated from past audits and was presented in Table I as total revenue and total expense. The percentage of change per year was tabled and presented in Table II.

A consumption chart was developed from data obtained from billing information and the present rate structure. This chart, Table III and Table IV, enables simple calculations to determine usage and revenue expectations. A breakdown in the number of customers by the gallons consumed can be obtained from the billing information. This information is very important in determining a rate adjustment. This chart allows the decision makers to determine how changes in the rate structure will affect the individual consumer groups. A wealth of data can be obtained from the consumer use chart.

Table V shows how the new rate is set. In our example a fifteen percent (15%) across the board increase is put into effect. Table V has the same data for number of customers by thousand gallon increments as does Table III and Table IV. Only the rate is changed in Table V reflecting the fifteen percent (15%) increase. The revenue projections are then carried out for each user.
group. Again, the totals show an increase in revenue of $39,000 from the old rate.

It is also pointed out in the example, that there are other alternatives to an across the board increase. An example is given to show changes that need to be made if the minimum bill does not increase. Alternatives such as this can be used throughout the rate structure.

The major purpose of a rate study is to determine if an alteration in rates is needed, and if so, the rate study should provide data to support a recommendation of an increase and alternatives to provide the needed revenue. In our case, a fifteen percent (15%) across the board increase was determined adequate. In addition, the rate study should investigate the operating procedure of the utility and present alternatives for cost saving measures and additional revenue sources. The following section will provide examples of cost saving techniques that can be implemented by utility departments.
STEPS TO COMPLETE A RATE STUDY

1. Gather Financial Data
2. Review Revenue and Expenditure Trends
3. Project Revenue and Expenditures
4. Determine Need for Increase
5. Develop Consumption Chart
6. Calculate Rate Adjustment
7. Substitute Rate Adjustment in Consumption Chart
8. Set New Rate
9. Review New Financial Data to Determine if Rate is Sufficient
   - IF NO, RETURN TO 4.
   IF YES, RETURN TO 1 IN A YEAR
RECOMMENDATIONS OF THE STUDY

A rate study would be incomplete without a section devoted to recommendations.

The essential element in this section is the proposed rate structure. The recommendations may be as simple as proposing an "across the board increase" or as complex as setting an entirely different rate structure which would overhaul the existing system by altering consumption categories and setting different rate charges.

Aside from recommending a rate structure that would solve the immediate financial needs, the rate study should include alternative operating procedures and cost saving measures.

This booklet has devoted a section to alternative revenue sources; however, a few cost saving ideas are worth mentioning. These ideas include: changes in billing cycles, water loss, meter reading procedures, and contracting of services.

Change in Billing Cycles

A review should be made of the billing cycle. Should bills be submitted monthly, bimonthly, quarterly, or a yearly budget-billing? Many municipalities could benefit by altering their billing frequency. Many times if the billing frequency is increased, direct billing costs go up, while financing and bad debt costs decline. If your systems bad debts are a relatively high percentage of the overall billing, a more frequent billing system may be a solution to the problem.³ Cash flow can be improved and billing cost may be offset in the reduction in collection staff since the workload is spread to a more manageable level.

Water Loss
A well maintained water system will average a loss of not more than fifteen percent (15%). This percentage is calculated as a ratio of water sold/water produced. Some of the loss can be attributed to unmetered usage such as hydrant flow, and in some systems the backwashing of the filtration plant. A small allowance should be made for loss through transmission lines. If your system is experiencing losses of greater than fifteen percent (15%), steps should be taken to bring the water loss down. Older systems usually have larger losses due to the age of the transmission lines and faulty meters.

**Meter Replacement Programs**

Meters often slow down with age and fail to register all of the water being passed. This results in lower water bills and lost revenue for the utility. A number of utilities have started a replacement program for their older meters and have significantly improved their revenues. This is a program that should be implemented for every utility system.

**Meter Reading Procedures**

The number of personnel used to read meters varies significantly with similar sized systems. A thorough study should be made of the time it takes per cycle period to read the meters, and to make sure they are read properly. Quarterly meter reading, with estimates for the intervening months may be a cost effective measure.

**Contracting of Services**

There are a number of private concerns that offer services for municipal utilities. A number of small systems have contracted their utility operations and have saved money. As quality standards become more stringent, and the
hiring of certified personnel becomes more expensive, a number of small utility operations have opted for this alternative.

Pro-Rating of Employees

Many small cities have employees that work on a combination of departments, i.e., street, water, sewer, and gas. When this occurs, proper time allocation should be charged to each department. This allows for better accounting and many times reduces the cost for one department while raising the cost for another department.

Bank Drafts

Some systems utilize bank drafts to pay the utility bill. Usually a customer signs a statement permitting the bank to directly transfer payment. The utility continues to send a bill to the customer and notes that a draft has been made and the bill is paid. This method saves the customer and the utility time, and insures payment of the bill.

There are numerous cost saving measures that can be implemented with very minimal up-front expenditures. Before a rate increase is put into effect, all of these alternatives should be explored. Also, the revenue section of this booklet should be reviewed to insure all alternative revenue sources have been explored.

The recommendation section of the rate study is important because it can be used to highlight procedure problems and offer alternatives in creating a more efficient system, thus holding back the future rate increases.
"Selling the New Rate Schedule"

The public should be aware that a possible rate increase is being studied. All data shall be readily available to interested consumers. An explanation of the reasons for the proposed rate increase should be given in advance of setting the new rate. If the public understands the reasons for the higher rate then acceptance of the rate increase will be enhanced.

An ongoing public information program should be implemented. It is surprising to learn how little the general public knows of the operations of the utility. Their major concern is, when the faucet is turned on, safe drinking water must flow out with adequate pressure. It is the duty and responsibility of the municipal utility to insure that an optimum level of service is maintained.

If the public is well informed and a rate schedule that is fair and equitable to all user classes is adopted, there should be little opposition to the increase in rates.

Review

It should be pointed out that once a new rate structure is decided upon, there will be a time lag of a few months before any increases in revenue will be forthcoming. This is due to the time required to pass the rate increase ordinance; and once the ordinance is passed there is lag time between the billing and the receipt of revenues. Also, it takes time to build up revenues to a point where deficits can be erased. A slight decrease in usage can be expected during the first few months that a rate increase becomes effective.

Although a rate increase may not be needed annually, it is a good idea to have a yearly review of the rate system and the financial picture of the
utility. This review should be held in conjunction with the yearly budget process.

In conclusion, the rate study consists of operations that require a general knowledge of the system; however, the operations are not complex so as to require expertise in the field of utility management to complete the study.
The Rate Study

SECTION VI - EPILOGUE
EPILOGUE

This booklet has been designed to assist the utility manager, utility board members, and other responsible employees or officials to recognize the need for utility rate increases and to properly design a rate structure to insure fair treatment of all user groups. A section has been devoted primarily to the steps taken when developing a rate study.

Inevitably, during some point of the rate study review, comparisons will be requested for rates charged by other utility systems. This is a pitfall which unfortunately influences many rate decisions. It should be pointed out that each system is unique and faces constraints that it must deal with individually. The rate structure should be designed to meet the financial, environmental, and organizational needs of the community it serves. Comparisons with other municipal utility rates cannot be justified as a means to set a rate structure. It may be politically favorable to have the "bragging rights" of having the lowest utility cost in the area, but if this low rate is causing long term harm due to deferred maintenance etc., then the low rates are actually harming the community which the utility serves. Each rate structure must be representative of the utility itself.

Hopefully, this booklet will enable the user to recognize the need for rate increases, and to assist in the design of a fair and equitable rate structure.
SELECTED BIBLIOGRAPHY

BOOKS
Oak Ridge, City of. Water and Sewer Rate Study. 1975

Groves, Sanford M. Evaluating Financial Condition (Set of 5 handbooks), #1, An Executive Overview of Local Government. International City Mgmt. Assn., 1980. BULLETINS AND PAMPHLETS


MAGAZINES


SECTION VII - APPENDICES
## APPENDICES

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>'A'</td>
<td>Net Cash Example</td>
</tr>
<tr>
<td>'B'</td>
<td>Water Environmental Health Act</td>
</tr>
<tr>
<td>'C'</td>
<td>Regulations Governing the Public Water and Wastewater Environmental Health Act</td>
</tr>
<tr>
<td>'D'</td>
<td>Use of Revenue, T.C.A. 7-34-115</td>
</tr>
<tr>
<td>'E'</td>
<td>Various State Statutes Concerning Utility Rate Structures</td>
</tr>
</tbody>
</table>
DETERMINING NET CASH

The following example is provided to show a way to determine net cash:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Revenue</td>
<td>200,000</td>
</tr>
<tr>
<td>Non-Operating Revenue</td>
<td>15,000</td>
</tr>
<tr>
<td></td>
<td>215,000</td>
</tr>
<tr>
<td>Less Operating Expenses</td>
<td>150,000</td>
</tr>
<tr>
<td>Non-Operating Expenses</td>
<td>50,000</td>
</tr>
<tr>
<td></td>
<td>-200,000</td>
</tr>
<tr>
<td>Gain or (Loss)</td>
<td>15,000</td>
</tr>
<tr>
<td>Add the Following:</td>
<td></td>
</tr>
<tr>
<td>Depreciation</td>
<td>40,000</td>
</tr>
<tr>
<td>Note Proceeds</td>
<td>0</td>
</tr>
<tr>
<td>Bond Proceeds</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Tap Fees</td>
<td>1,000</td>
</tr>
<tr>
<td>Grants</td>
<td>2,000,000</td>
</tr>
<tr>
<td></td>
<td>3,041,000</td>
</tr>
<tr>
<td>Less the Following:</td>
<td></td>
</tr>
<tr>
<td>Principal Paid</td>
<td>30,000</td>
</tr>
<tr>
<td>Purchase of Fixed Assets</td>
<td>3,000,000</td>
</tr>
<tr>
<td>Transfer to Reserve Fund</td>
<td>20,000</td>
</tr>
<tr>
<td></td>
<td>3,050,000</td>
</tr>
<tr>
<td></td>
<td>-3,050,000</td>
</tr>
<tr>
<td>Net Cash</td>
<td>6,000</td>
</tr>
</tbody>
</table>
TENNESSEE DEPARTMENT OF PUBLIC HEALTH

CHAPTER 205

WATER ENVIRONMENTAL HEALTH ACT

Sections: 53-2030. Definitions
Sections: 53-2033. Certification of Waterworks.
Sections: 53-2040. Fee Collections - Funding.
Sections: 53-2041. Criminal Penalties.

53-2001. DEFINITIONS - The words, phrases, and terms used herein shall have the following meanings:

"Commissioner" - The commissioner shall be the commissioner of the Tennessee Department of Public Health or his duly authorized representative.

"Board" - Shall be the board of certification.

"Certificate" - A certificate of competency issued by the commissioner stating that the operator has met the requirements for the specified operator classification of the certification program.

"Water supply system" - Shall mean the system of pipes, structures, and facilities through which water is obtained, treated, and sold, distributed or otherwise offered to the public for household use or any use by humans. An industrial water system is excluded from this definition.

"Water treatment plant" - Shall mean that portion of the water supply system which in some way alters the physical, chemical, or bacteriological quality of the water.

"Wastewater treatment plant" - Shall mean the facility of group of units provided for the treatment of wastewater, either or both domestic and industrial wastes. Industrial wastes that do not enter a public wastewater system are excluded from this definition.
"Water distribution system" - Shall mean that portion of the water supply system in which water is conveyed from the water treatment plant or other supply point to the premises of the consumer.

"Operator" - Shall be the person who is in direct responsible charge of the operation of a water treatment plant, wastewater treatment plant, water distribution system, or wastewater collection system. Persons such as commissioners of public works or commissioners of sewers shall not be considered to be operators unless they personally supervise the operation of such facilities. The definition herein provided for shall also include the operator of a remote control system which is a system in which the operator is in direct control of the entire system from a central point. (Acts 1971, chapter 205, subsection 2.)

53-2031. CERTIFICATION OF WATERWORKS OPERATOR - After one (1) year following May 14, 1971, it shall be unlawful for any person, firm, or corporation, both municipal and private, operating a water supply system or wastewater system, to operate the water treatment plant, wastewater treatment plant, or water distribution system unless the competency of the operator who is in direct responsible charge is duly certified to by the commissioner under the provisions of Subsections 53-2029 through 53-2041. Furthermore, it shall be unlawful for any person to perform the duties of an operator without being duly certified under the provisions of Subsections 53-2029-53-2041. (Acts 1971, chapter 205, subsection 3.)

53-2032. BOARD OF CERTIFICATION ESTABLISHED - APPOINTMENT - TERMS OF OFFICE - EXAMINATIONS - A board of certification is established to advise and assist the commissioner in the administration of the certification program. The board is charged with the responsibility of conducting all work necessary to promote the program and maintain records, and shall also adopt rules and regulations required in performing its obligations. Approval of the commissioner of all rules and regulations is required.

A. Such board shall be composed of the following members:

(1) Two (2) members who are currently employed as water or wastewater operators holding valid certificates. One of these members shall hold a certificate of the highest class issued by the board. There is no restriction on the classification or the certificate held by the other operator. The governor of the State of Tennessee shall consult with the president of Tennessee Water and Wastewater Association to determine qualified persons for these posts.

(2) One (1) member of represent the municipalities of Tennessee. The governor shall consult with the president of the Tennessee municipal league to determine a qualified person to fill this post.

(3) One (1) member who is a faculty member of a college, university, or state technical institute, whose major field is related to sanitary engineering. The governor shall consult with the president of the Tennessee Society of Professional Engineers to determine a qualified person to fill this post.

(4) One (1) ex officio member representing the Tennessee Department of Public Health. This member will be the director of the division of sanitary engineering or such qualified member of his staff as he may designate.
B. Board members shall serve for a three (3) year term except as designated herein, and all appointments shall expire on June 30 of the appropriate year. A board member shall continue to serve, however, until a successor has been appointed, or until he has been reappointed.

1) The first four (4) board members in (A) above shall be appointed for terms of one (1), two (2), or three (3) years, so that not more than two (2) terms shall expire in the same year. The municipal representative shall serve for two (2) years; the faculty member for two (2) years; one (1) operator for one (1) year; and the other operator for three (3) years. There shall be no time limit on the term of the ex officio member.

2) Appointments to succeed a board member who is unable to serve his full term shall be for the remainder of that term.

3) Board members may be reappointed, but they do not succeed themselves automatically.

4) Appointments to the board for the remainder of an unexpired term, and reappointments shall be made in the same manner as under subsection (A).

5) Any board member who leaves his field of employment or moves from Tennessee is automatically terminated from the board.

C. At the first meeting each year after July 1, the board shall elect form its membership a chairman.

D. The state department of public health representative shall serve as secretary of the board and be responsible for maintaining records.

E. The members of the board shall serve without compensation, except for their actual and necessary expenses incurred while discharging their official duties. All reimbursement for travel expenses shall be in accordance with the provisions of the comprehensive travel regulations as promulgated by the Department of Finance and Administration and approved by the attorney general.

F. Duties of the board shall include:

1. Hold at least one (1) examination annually at a designated time and place for the purpose of examining candidates for certification.

2. Advertise and promote the program.

3. Encourage other operators to become certified besides those required by law.

4. Distribute applications and notices.

5. Receive and evaluate applications.

6. Prepare, conduct and grade examinations.
7. Set up a system of fees for applicants to support the expenses of the program.

8. Maintain all records of the program, and maintain a register of certificated operators.

9. Promote and schedule regular training schools and programs.

10. To hear appeals from orders, rulings and regulations issued by the commissioner and to affirm, modify, or revoke such orders, rulings and regulations, to issue notices of such appeals and subpoenas requiring attendance of such witnesses and production of such evidence, to administer oaths, and to take such testimony as the board deems necessary.

G. A quorum of the board shall be at least three (3) members. (Acts 1971, chapter 205, subsection 4; 1976 (Adj. S.), chapter 806, subsection 1(90).)

53-2033. CLASSIFICATION OF WATERWORKS - The commissioner shall classify all water treatment plants, wastewater treatment plants, water distribution systems and wastewater collection systems with due regard to the size, type, physical conditions affecting such treatment plants and distribution systems, and according to the skill, knowledge, and experience that the operator must have to supervise successfully the operation of the plant or system so as to protect the public health. (Acts 1971, chapter 205, subsection 5.)

53-2034. CERTIFICATION OF WATERWORKS OPERATORS - RECOMMENDATIONS - The commissioner shall certify persons as to their qualifications to supervise successfully the operation of such water treatment plants, wastewater treatment plants, water distribution systems, and wastewater collection systems after considering the recommendations of the board appointed by the governor of the state of Tennessee. (Acts 1971, chapter 205, subsection 6.)

53-2035. RULES AND REGULATIONS - The commissioner, with the advice of the board (and in accordance with existing state laws), shall formulate rules and regulations as are reasonably designed to carry out the intent of subsections 53-2029 through 53-2041. These shall include, but are not limited to, provisions for establishing the basis for classification of water treatment plants, wastewater treatment plants, water distribution systems, and wastewater collection systems and provisions establishing qualifications of applicants and procedures for examination of candidates. (Acts 1971, chapter 205, subsection 7.)

53-2036. NECESSITY OF CERTIFICATION - SMALL SYSTEMS WITH ONE CERTIFIED OPERATOR - All operators of water and wastewater systems are encouraged to become certified, although subsections 53-2029 through 53-2041 require only that the one (1) person in direct charge of a water treatment plant, wastewater treatment plant, or water distribution system, be certified. In a small system, or wastewater collection systems there is nothing to prohibit a single person becoming the certified operator for more than one of the above functions. It shall be permissible for one (1) certified operator to have the responsibility for more than one water and/or wastewater system where two (2) or more small systems are involved in reasonable proximity to one another, and where the duties of operation are such that the work time of one (1) person may properly be divided among two (2) or more systems, or where the certified operator may adequately
supervise the work of others in more than one system. (Acts 1971, chapter 205, subsection 8.)

53-2037. ISSUANCE OF CERTIFICATES - RENEWAL - FOREIGN CERTIFICATES - CURRENT OPERATORS - EXCEPTION -

A. Upon satisfactory fulfillment of the requirements and based upon recommendation of the board the commissioner shall issue a suitable certificate to the applicant designating his competency. The certificate will indicate that portion of the plant or system for which the operator is qualified. Certificates shall be permanent except as noted subsequently in subsections 53-2029 through 53-2041.

B. Certificates shall be renewed annually upon payment of the renewal fee, unless revoked for cause, replaced by one of a higher grade, or invalidated under E below.

C. Certified operators who desire to become certified in a higher grade must satisfactorily complete the requirements before the certificate is issued.

D. Certificates shall be valid only so long as the holder uses reasonable care, judgement, and application of his knowledge in the performance of his duties. No certificate will be valid if obtained through fraud, deceit, or the submission of inaccurate data on qualifications.

E. The certificates of operators who terminate their employment will be valid for two (2) years upon payment of the annual renewal fee. After two (2) years, the certificate automatically expires. Operators whose certificates become invalidated may be issued new certificates of like classification upon submission of appropriate proof of competency to the board. At its discretion, the board may require a written examination.

F. Certificates may be issued, without examination, in a comparable classification to any person who holds a certificate in another state, provided the requirements of that state are comparable or higher, and provided such requirements do not conflict with the provisions of subsection 53-2029 through 53-2041. Such issuance of a certificate is also contingent upon reciprocal privileges being granted by that state to an operator from Tennessee.

G. Certificates in an appropriate classification may be issued to operators without examination, who, on May 14, 1971, hold certificates of competency issued to them through the existing voluntary certification program now in operation in the state of Tennessee under the sponsorship of the Tennessee Department of Public Health.

H. The board will issue certificates of the proper classification without examination to the person to the person who is in direct responsible charge of the treatment works or water distribution system on May 14, 1971, even though that person is not already certified under the existing voluntary certification program. To issue such a certificate, the board must receive a letter from the governing body, or owner, designating the person in direct responsible charge. A certificate so issued will be valid only for that plant or system (Acts 1971, chapter 205, subsection 9.)
53-2038. REVOCATION OF CERTIFICATE - APPEAL - The board with the approval of the commissioner, may revoke the certificate of an operator, following a hearing before the board, when it is found that the operator has practiced fraud or deception; that reasonable care, judgement, or the application of his knowledge was not used in the performance of his duties; or that the operator is incompetent to perform his duties properly. Appeal from the decision of the board may be made to any court of competent jurisdiction. (Acts 1971, chapter 205, subsection 10.)

53-2039. REPLACEMENT OF CERTIFIED OPERATOR - EXCEPTION - At its discretion, the board may allow a period of up to six (6) months for the replacement of a certified operator whose services have been lost by death, illness, or other unusual events. Further extensions of thirty (30) days, up to a total of ninety (90) additional days, may be granted if deemed necessary by the board. However, monthly reports must be submitted on the progress towards compliance. (Acts 1971, chapter 205, subsection 11.)

53-2040. FEE COLLECTIONS - FUNDING - All fees collected under the provisions of subsections 53-2029 through 53-2041 shall be paid into the state treasury as now required of all such regulatory boards and the same shall be expended in the same manner as required of such boards. The director of finance and administration with the governor's approval is authorized to allot to the Department of Public Health such funds as are necessary for the administration of subsections 53-2029 through 53-2041 and the Department of Public Health is hereby designated as the administrative agency for the board created under subsections 53-2029 through 53-2041. (Acts 1971, chapter 205, subsection 12.)

53-2041. CRIMINAL PENALTIES - Any municipality, utility district, or corporation, violating any provision of subsections 53-2029 through 53-2041 or the rules and regulations adopted thereunder is guilty of a misdemeanor, and that each day in violation of subsections 53-2029 through 53-2041 or the rules and regulations, shall constitute a separate offense subject to a fine of not less than fifty dollars ($50.00) and not more than five hundred dollars ($500). (Acts 1971, chapter 205, subsection 13.)
Rules
Of
Tennessee Department of Public Health
Division of Water Quality Control

Chapter 1200-5-3
Regulations Governing the Public Water and
Wastewater Environmental Health Act

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Chapter No. 1200-5-3 is deleted in its entirety and the following is substituted in lieu thereof:

1200-5-3-.01 APPLICATION FOR CERTIFICATE

(1) An applicant desiring to be certified shall file a notarized application with the Board not later than one month preceding the date of the examination on the application form provided by the Board. The fee shall accompany the application.

(2) The Board shall review all applications and verification documents, required by the Board to determine the eligibility of the applicant for certification. The applicant shall be notified in writing.

(3) Those applicants not meeting the requirements contained in Section 53-2037(F), (G), or (H) of the Tennessee Code Annotated will be required to take the examination in order to be certified.

(4) A copy of all verification documents must be submitted in support of the application. This includes a copy of high school diploma, GED certificate, and official college transcripts. Transcripts must be submitted directly from the college and/or university to the Operator Certification Board. Credit for special training and schools will only be given upon verification that the course was completed. A copy of attendance card or certificate will be acceptable.

Authority: T.C.A. Section 53-2032.

1200-5-3-.02 EXAMINATION

(1) All examinations will be written.

(2) All examinations will be closed book.

(3) The examination may contain one or more of the following type questions: matching, multiple choice, true-false, discussion, short answer, and problems.

(4) A grade of 70 percent or higher must be obtained in order for a certificate to be issued.

(5) Applicants will be notified in writing as to whether or not the examination grade was satisfactory for the issuance of a certificate.

(6) The applicant may obtain his/her grade by written request.

(7) Applicants who fail to pass an examination may re-apply for an examination.

(8) Applicants will be required to furnish pencils, pens, calculators, or slide rule. Extra paper that may be needed will be furnished by the Board.

(9) Applicants that fail to pass the examination may request to see the examination paper. All requests to review an examination must be made
in writing to the Board. The applicant may request permission for his/her supervisor to review the examination.

(10) All examinations will be administered by the Board or their authorized representatives. The Board will be responsible for maintaining the integrity of all examinations.

Authority: T.C.A. Section 53-2032.

1200-5-3-.03 FEES

(1) Fee for certification shall be paid in advance, as follows:

(a) Operator Examination fee (each examination taken) $10.00
(b) Initial registration fee $10.00
(c) Re-examination for a new certificate or to make up for failure to pass an examination $10.00
(d) Reinstatement or renewal of all water or wastewater operator certificate $10.00

(2) Fees from applicants who are rejected will be returned to them. Fees from those failing to pass an examination will not be returned.

(3) Those applicants for examination who fail to take an examination on two successive series of scheduled examination dates shall forfeit the examination fee.

(4) The operators are responsible for keeping the Board informed as to their current address.

(5) The annual renewal fee is due by December 31st of each year. If annual renewal fee is received within thirty (30) days after date due operator’s certificate will automatically be renewed. After expiration of said grace period of thirty (30) days, operator will have to pass written examination to renew his/her certificate.

Authority: T.C.A. Section 53-2032.

1200-5-3-.04 GENERAL

(1) Certification under Tennessee Code Annotated 53-2029 through 53-2041 "Public Water and Wastewater Environmental Health Act of 1971," is available to all operators of water treatment plants and wastewater distribution systems or wastewater treatment plants and wastewater collection systems who can meet the minimum qualification of a given classification. Each operator is encouraged to apply for certification in the highest classification consistent with his qualifications.

(2) Every operator in responsible charge at a water treatment plant, wastewater treatment plant, wastewater collection system, or a water distribution system shall hold a certificate in a grade equal to or higher
than the grade of his collection system, treatment plant or distribution system.

Authority: T.C.A. Section 53-2035.

1200-5-3-.05 DEFINITIONS

(1) Population Equivalent - Shall mean the load on the treatment plant, expressed in terms of the equivalent number of gallons per capita day, 1 Population Equivalent being equal to 100 gpcd.

Authority: T.C.A. Section 53-2035.

1200-5-3-.06 QUALIFICATIONS AND CLASSIFICATIONS FOR WATER TREATMENT PLANT AND DISTRIBUTION SYSTEM OPERATORS

(1) Grade IV

(a) The applicant must have a degree in engineering, chemistry, or related science, from an accredited college or university, at least one year of actual operating experience acceptable to the Board in a Grade II or IV water plant, and pass the required written examination, or

(b) The applicant must be a graduate of an accredited high school, have special training in chemistry, bacteriology, and the fundamentals of water treatment, through operators' schools, correspondence courses, or other training programs, have at least five years of actual operating experience acceptable to the Board in a Grade III or Grade IV water plant, and pass the required written examination. Each year of college completed in engineering or science related degrees approved by the Board will be considered an equivalent of one year of experience up to a maximum of four years.

(2) Grade III

(a) The applicant must have graduated from an accredited high school, have at least one year of actual operating experience acceptable to the Board in Grade II or III water plant, and pass the required written examination, or

(b) The applicant must have a combination of formal education and actual operating experience (minimum 8th grade and 5 years experience) including a minimum of one year of actual operating experience acceptable to the Board in a Grade II or Grade III water plant, and pass the required written examination.

(3) Grade II

(a) The applicant must have graduated from an accredited high school, have at least one year of actual operating experience acceptable to the Board in a Grade II or Grade I water plant, and pass the required written examination or,
(b) The applicant must have a combination of formal education and actual operating experience (minimum 5th grade and 3 years of experience) including a minimum of one year of actual operating experience acceptable to the Board in a Grade II or Grade I water plant, and pass the required written examination.

(4) Grade I

The applicant must have at least one year of actual operating experience acceptable to the Board in a Grade I plant and pass the required written examination.

(5) The requirements for distribution system operators are basically the same as those for treatment plant operators, except that the experience requirements are for the distribution system in the grade under consideration, instead of the treatment works.

(6) Applicants may be given credit for some portion of the deficiency in their formal education or experience if they have completed vocational training, special schools, short courses, correspondence courses, etc. approved by the Board. A GED certificate will substitute for the high school education requirement. However, at least one year of actual water plant experience is required in all cases.

(7) To maintain an active certificate, all operators and operator consultants must attend, at least once each three years a training course or school approved by the Board.

(8) The Board may approve operating experience in maintenance, laboratory work, or work in allied trades or fields. Sixty percent credit given for wastewater experience.

Authority: T.C.A., Section 53-2035.

1200-5-3-.07 CLASSIFICATION OF WATER TREATMENT PLANTS AND DISTRIBUTION SYSTEMS

(1) Treatment plants and distribution systems shall be classified in one of four groups, designated as Grade I, II, III, and IV. These classifications shall be made according to population served, type of treatment plant, and the complexity of treatment required for a particular water.

(2) Classification of any treatment plant may be changed by the Commissioner upon recommendation of the Board by reason of changes in conditions or circumstances upon which the original classification was predicated. Due notice of such change shall be given to the owner or management of the treatment plant.

(a) Grade IV

All water treatment plants using filtration or lime-soda softening processes requiring chemical and bacteriological control of operation and designed for 2800 gpm or larger.
(b) **Grade III**

1. All water treatment plants using filtration or lime-soda softening processes requiring chemical and bacteriological control of operation and designed to operate from 700 gpm but less than 2800 gpm.

2. All distribution systems serving in excess of 50,000 population.

(c) **Grade II**

1. All water treatment plants using filtration or lime-soda softening processes requiring chemical and bacteriological control and designed to operate from 141 gpm but less than 700 gpm.

2. All other water treatment plants requiring chemical control of operation designed to operate at 701 gpm or greater.

3. All distribution systems serving from 15,000 to 50,000 population.

(d) **Grade I**

1. All water treatment plants using filtration or lime-soda softening processes requiring chemical and bacteriological control and designed to operate at 140 gpm or less.

2. All other water treatment plants requiring chemical control of operation and which are designed to operate at 700 gpm or less.

3. All water treatment plants requiring only chlorination for treatment.

4. All distribution systems serving less than 15,000 population.

Authority:  T.C.A., Section 53-2-35.

1200-5-3.08 QUALIFICATIONS AND CLASSIFICATIONS FOR WASTEWATER TREATMENT PLANT OPERATORS AND COLLECTION SYSTEM OPERATORS.

(1) **Grade IV**

(a) The applicant must have a degree in engineering, chemistry, or related science, from an accredited college or university, at least one year of actual operating experience acceptable to the Board in a Grade III or IV plant, and pass the required written examination, or

(b) The applicant must be a graduate of an accredited high school, have special training in chemistry, bacteriology, and the fundamentals of treatment through operator's schools, correspondence courses or other training programs approved by the Board, have at least five years of actual operating experience acceptable to the Board in a
Grade III or IV wastewater treatment plant, and pass the required written examination. Each year of college completed in engineering or chemistry will be considered the equivalent of one year of experience.

(2) **Grade III**

(a) The applicant must have graduated from an accredited high school and have at least one year of actual operating experience acceptable to the Board in a Grade II or III wastewater treatment plant, and pass the required written examination, or

(b) The applicant must have a combination of formal education and actual operating experience (minimum of 8th grade and 5 years experience) including a minimum of one year of actual operating experience acceptable to the Board in a Grade II or III wastewater treatment plant, and pass the required written examination.

(3) **Grade II**

(a) The applicant must have graduated from an accredited high school, have at least one year of actual operating experience acceptable to the Board in a Grade I or II wastewater treatment plant, and pass the required written examination, or

(b) The applicant must have a combination of formal education and actual operating experience (minimum 5th grade and 3 years experience) including a minimum of one year of actual operating experience acceptable to the Board in a Grade I or II wastewater treatment plant, and pass the required written examination.

(4) **Grade I**

The applicant must have at least one year of actual operating experience acceptable to the Board in a Grade I plant and pass the required written examination.

(5) **Collection Systems** - The requirements are the same as for treatment plants except that experience must be in the collection system.

(6) Applicants may be given credit for some portion of the deficiency in their formal education or experience if they have completed vocational training, special schools, short courses, correspondence courses, etc. approved by the Board. A GED certificate will substitute for the high school education requirement. However, at least one year of actual water plant experience is required in all cases.

(7) To maintain an active certificate, all operators and operator consultants must attend, at least once every three years, a training program or school approved by the Board.

(8) The Board may approve operating experience in maintenance, laboratory work, or work in allied trades or fields. Forty percent credit will be given for waterworks experience.

**Authority:** T.C.A., Section 53-2035.
1200-5-3-.09 CLASSIFICATION OF WASTEWATER TREATMENT PLANTS AND COLLECTION SYSTEMS

(1) Treatment plants and collection systems shall be classified in one of four groups, designated as Grade I, II, III, and IV. These classifications shall be made according to population served, type of works, character, and volume of wastes to be treated and the use and nature of the water resources receiving the plant effluent.

(2) Classification of any treatment plant may be changed by the Commissioner upon recommendation of the Board by reason of changes in any condition or circumstances upon which the original classifications was predicated. Due notice of any such change shall be given to the owner of the treatment plant.

(a) Grade IV

All plants designed to serve a population or population equivalent greater than 40,000 (4.0 MGD).

(b) Grade III

1. Plant designed for a population or population equivalent between 10,000 and 40,000 (1.0 MGD to 4.0 MGD).

2. Collection systems serving more than 40,000 persons or population equivalent.

(c) Grade II

1. Plants designed for a population or population equivalent less than 2,001 (.2 MGD) and 10,000 (1.0 MGD).

2. Collection system serving 10,001 population or population equivalent to 40,000.

(d) Grade I

1. Plants designed for a population or population equivalent less than 2,000 (.2 MGD).

2. Collection system serving less than 10,000 population or population equivalent.

3. All lagoons (stabilization ponds) regardless of size used to treat raw waste.

4. All wastewater plants using the extended aeration process with a capacity of 75,000 gpd or less and serving small facilities such as motels, campgrounds, parks, schools, etc.

Authority T.C.A., Section 53-2035.
7-34-115. Use of revenues. — (a) Any municipality shall devote all revenues derived from a public works to or for the payment of all operating expenses, bond interest and retirement and/or sinking fund payments; the acquisition and improvement of the public works; contingencies; the payment of other obligations incurred in the operation and maintenance of the public works and the furnishing of services; the redemption and purchase of bonds, in which case such bonds shall be canceled; the creation and maintenance of a cash working fund; the payment of an amount to the general funds of the municipality not to exceed a cumulative return of six percent (6%) per annum of the equity or investment, if any, of the municipality; and, if the governing body of the municipality shall by resolution so request, payments to the municipality in lieu of ad valorem tax on the property of the public works within the corporate limits of the municipality not to exceed the amount of taxes payable on privately owned property of similar nature.

(b) Any surplus thereafter remaining, after establishment of proper reserves, if any, shall be devoted solely to the reduction of rates; provided, any municipality having retired all bonds issued pursuant to this chapter to finance the acquisition, purchase, construction, reconstruction, improvement, betterment or extension of a waterworks and/or water distribution system may devote surplus revenues of the waterworks and/or water distribution system to any municipal purpose, provided no contractual obligations are thereby violated.

(c) In the event a municipality establishes a pension plan for employees of such public works, expenditures incident to inaugurating and maintaining such plan shall be deemed an operating expense for purposes of this section.

(d) In computing the equity of investment of the municipality, the value of the public works shall be taken as its historical cost. The payment of bonds or the acquisition or improvement of property from the receipts derived from a public works or any other operation of the public works as such shall not be considered to increase the equity of investment of the municipality.

(e) Nothing in this section contained, however, shall be construed to limit the power of the municipality to make contracts with the purchasers of bonds:

(1) As to the use and disposition of the revenues otherwise than as hereinabove set forth;

(2) As to the order of application of such revenues; or

(3) As to limitations on the amount of payments to the municipality either as a return on the equity of investment of the municipality, if any, or as a payment in lieu of taxes. [Acts 1935 (E. S.), ch. 33, § 11; 1949, ch. 43, § 1; C. Supp. 1950, § 4406.52 (Williams, § 4406.44); Acts 1969, ch. 335, § 2; T.C.A. (orig. ed.), § 6-1315.]

Cross References. Tax equivalent payments authorized, §§ 7-52-301 — 7-52-306
Section to Section References. This section is referred to in § 7-52-302.

7-34-116. Exemption from taxation. — So long as a municipality shall own any public works the property and revenue of such public works shall be
MEMORANDUM

TO: Mr. W. R. Snodgrass
    Comptroller of the Treasury

FROM: Dennis F. Dycus, CPA, Director
    Division of Municipal Audit

SUBJECT: Financial Information on the Water and Sewer
    Systems Operated by Tennessee Local Governments

The cost of providing clean water and safe sanitary services to the citizens of the state of
Tennessee is an area of increasing concern. Many of the water and/or sewer systems
operated by local governments are old and in poor operating condition. Many have a large
amount of outstanding bonded debt. Several systems have had problems servicing the
debt. Many systems have built up huge operating losses over the past several years. In
more than one instance, these cumulative losses, in the form of a deficit retained earnings
balance, exceeds $1,000,000.00.

It appears that with the cost of operation continuing to increase along with the financial
drain of servicing outstanding long-term debt, combined with the high rates of interest
associated with any new debt issued, Tennessee's local governments do not have a bright
future to look forward to.

The following information on the water and/or sewer systems of Tennessee's cities, towns
and utility districts has been assembled in order to point out the systems which are
presently in or very close to experiencing financial difficulty. What to do in order to
correct this situation is a very large problem with no easy solution.

Presently, various state statutes require that water and sewer systems charge rates which
will allow them to recover their cost of operation, including depreciation and to retire
current debt including principal and interest.

Chapter 34—Municipal Utilities

Section 7-34-103, Tennessee Code Annotated, states that:

It is declared to be the policy of this state that any
municipality acquiring, purchasing, constructing,
reconstructing, improving, bettering or extending any public
works pursuant to this chapter, shall manage such public works
in the most efficient manner consistent with sound economy and public advantage to the end that the services of the public works shall be furnished to consumers at the lowest possible cost. No municipality shall operate such public works for gain or profit or primarily as a source of revenue to the municipality, but shall operate such public works for the use and benefit of the consumers served by such public works and for the promotion of the welfare and for the improvement of the health and safety of the inhabitants of the municipality. No use of revenues authorized by this chapter shall be construed as being contrary to the policy declared in this section.

Section 7-34-114, Tennessee Code Annotated, states that:

The governing body of a municipality issuing bonds pursuant to this chapter shall prescribe and collect reasonable rates, fees or charges for the services, facilities and commodities of such public works, and shall revise such rates, fees or charges from time to time whenever necessary so that such public works shall be and always remain self-supporting. The rates, fees or charges prescribed shall be such as will produce revenue at least sufficient:

1) To pay when due all bonds and interest thereon, for the payment of which such revenue is or shall have been pledged, charged or otherwise encumbered, including reserve therefor; and

2) To provide for all expenses of operation and maintenance of such public works, including reserves therefor.

Chapter 35—Sewers and Waterworks

Section 7-35-414, Tennessee Code Annotated, states:

(a) The governing body of any city or town acquiring and operating and waterworks and/or sewerage system under the provisions of this part shall have power, and it shall be its duty, by ordinance to establish and maintain just and equitable rates and charges for the use of and the service rendered by such waterworks and/or sewerage systems, to be paid by the beneficiary of the service. Such rates and charges shall be adjusted so as to provide funds sufficient to pay all reasonable expenses of operation, repair, and maintenance, provide for a sinking fund for payment of principal and interest of bonds when due and maintain an adequate depreciation account, and they may be readjusted as necessary from time to time by amendment to the
ordinance establishing the rates then in force. Any upward adjustment of rates and charges for sewage services shall not be granted solely on the basis of increases of rates and charges for water services, but shall be made only after a finding by the governing body that such an adjustment is reasonable and justified; provided, however, that this sentence shall not apply to counties with a metropolitan form of government. A copy of the schedule of such rates and charges so established shall be kept on file in the office of the board having charge of the operation of such works, and also in the office of the city or town clerk, and shall be open to inspection by all parties interested.

(b) If any municipality in Tennessee adopts a sewer fee ordinance which includes a minimum base rate charge payable to all sewer users, it is declared the public policy of the state that such minimum base rate charge shall be considered to be a local tax upon sewer users in the same manner that local property taxes are so considered. However, user fees paid in excess of the minimum base rate charge which are related to the volume or strength of sewage discharged shall be considered as user fees in the same manner in which electrical, gas, or water consumption is related to actual use.

Chapter 36—Municipal Public Works Projects

Section 7-36-127, Tennessee Code Annotated, states that:

The governing body of a municipality issuing bonds payable exclusively from the revenue of a public works project shall prescribe and collect reasonable rates, fees or charges for the services, facilities and commodities of such public works project, and shall revise such rates, fees or charges from time to time whenever necessary so that such public works project shall be and always remain self-supporting. The rates, fees or charges prescribed shall be such as will produce revenue at least sufficient:

(1) To pay when due all bonds and interest thereon, for the payment of which such revenue is or shall have been pledged, charged or otherwise encumbered including the accumulation during the first five (5) years of the operation of such public works project of a reserve equal to the average annual requirements for the payment of principal and interest on outstanding bonds issued pursuant to this chapter for such public works project, which reserve shall be accumulated at the rate of twenty percent (20%) per annum; and
(2) To provide for all expenses of operation and maintenance of such public works project, including reasonable reserves therefor.

Chapter 81—Utility Districts

Section 7-82-403, Tennessee Code Annotated, states that:

The board of commissioners of any district issuing bonds pursuant to this chapter shall prescribe and collect reasonable rates, fees, tolls or charges for the services, facilities and commodities of its system or systems, shall prescribe penalties for the nonpayment thereof, and shall revise such rates, fees, tolls or charges from time to time whenever necessary to insure that such system or systems shall be and always remain self-supporting. The rates, fees, tolls or charges prescribed shall be such as will always produce revenue at least sufficient:

(1) To provide for all expenses of operation and maintenance of the system or systems, including reserves therefor; and

(2) To pay when due all bonds and interest thereon for the payment of which such revenues are or shall have been pledged, charged or otherwise encumbered, including reserves therefor.

As evidenced by the above statutory provisions, it appears that under each of the various chapters which a water and/or sewer system may be financed, every system should charge sufficient rates to enable them to remain self-supporting, including payment of all bond and interest debts upon maturity. As disclosed by the following financial information, that has not always been the situation in many of Tennessee's local government-owned and operated water and sewer systems.

If after reviewing the attached information you should have any questions, I will be happy to discuss them with you at your convenience.

DFD/ra

Attachment