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WATER AND WASTEWATER MANAGEMENT

Steve Wyatt and Brett Ward, Utilities Consultants
and Bill Young, Assistant General Manager, Harriman Utility Board

December 2009

THE UNIVERSITY of TENNESSEE
MUNICIPAL TECHNICAL ADVISORY SERVICE

In cooperation with the Tennessee Municipal League

WATER AND WASTEWATER MANAGEMENT

Steve Wyatt and Brett Ward, Utilities Consultants and Bill Young, Assistant General Manager, Harriman Utility Board

December 2009

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The Municipal Technical Advisory Service (MTAS) was created in 1949 by the state legislature to enhance the quality of government in Tennessee municipalities. An agency of the University of Tennessee Institute for Public Service, MTAS works in cooperation with the Tennessee Municipal League and affiliated organizations to assist municipal officials.

By sharing information, responding to client requests, and anticipating the ever-changing municipal government environment, MTAS promotes better local government and helps cities develop and sustain effective management and leadership.

MTAS offers assistance in areas such as accounting and finance, administration and personnel, fire, public works, law, ordinance codification, and wastewater management. MTAS houses a comprehensive library and publishes scores of documents annually.

MTAS provides one copy of our publications free of charge to each Tennessee municipality, county and department of state and federal government. There is a $10 charge for additional copies of "Water and Wastewater Management."

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EXECUTIVE SUMMARY

The purpose of this manual is to provide a resource for both new and experienced water board members and municipal officials who have little or no formal training for the job.

The manual is an introduction for the individual who does not have experience in the area or who would like some guidance in the effort to improve the leadership, management and operations of a water/wastewater system. It includes step-by-step guides for many of the tasks expected of board members. Wherever possible, it refers the reader to additional sources for more information.

The manual is divided into three parts:

- Chapter I is an overview of the duties and obligations of board members. It includes sections on planning and development, on overseeing the management and operation of the water system and on conducting board meetings.
- Chapter II deals with financial issues.
- Chapter III includes legal, technical and regulatory compliance information.

SPECIAL ACKNOWLEDGEMENT

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Chapter 1: Duties and Obligations of Utility Board Members

LEGAL AUTHORITY

Through either the state constitution or individual legislation, each state legally authorizes local entities to provide water and wastewater disposal services to the public. The legal right to supply public water services may be granted to a variety of entities, both public and private. Public entities authorized to operate water/sewer services may include municipal or county governments, utility authorities, public service or public improvement districts or utility districts. Private entities may include nonprofit corporations. The specific statutes governing a particular water service vary from entity to entity, depending on whether it is public or private and under what type of law it was organized. However, the laws will regulate at least these aspects:

- The legal process for forming and governing the entity;
- General and specific powers granted to the entity by the state;
- Powers or authority prohibited by the state; and
- Other special provisions related to legally prescribed methods of operation, record keeping, and reporting requirements to state agencies and other authorities.

In addition to the authorizing statutes, many other state, local and federal laws may apply to the conduct and administration of the operating entity and to the operation of the water system itself. The largest body of state law regulating any water system will be the one that is designed to protect the public health. Other laws, codes, procedures, and regulations that may apply include the following:

- Procedures for purchasing and procuring goods and services;
- Regulations regarding contracts and contracting for services and construction activities;
- Procedures for proper record keeping and reports relating to system operation and management;
- Procedures for accounting and auditing financial records;
- Rights of eminent domain and property acquisition;
- Insurance and bonding for public facilities and public officials;
- Laws affecting the ability of the entity to incur debt;
- Laws regulating service areas or establishing service boundaries;
- Laws dealing with sales, use, franchise and income taxes;
- Labor relations statutes of all types;
- Laws affecting the frequency, form and general conduct of the meetings of boards of directors;
- Ethics standards applicable to boards and council members;

- Freedom of information and open meeting laws (so-called Sunshine Laws); and
- Employee and public safety.

In addition to state laws, a utility may be governed by a county, municipal or corporate charter; by articles of incorporation or bylaws; by local ordinances of various types; and by various other laws and documents. It is the responsibility of utility board members to be familiar with and knowledgeable about any and all laws and/or documents that grant and otherwise control the utility's authority to operate. The board should ensure that copies of all documents relating to the origination or incorporation of the legal entity authorized to operate the water system are maintained in the system records. These documents may include, but are not limited to the following:

- State or local enabling legislation;
- Municipal charter;
- Articles of incorporation;
- Corporation bylaws;
- Petitions to courts, court orders, resolutions or judgments;
- Local ordinances or acts;
- Interlocal agreements with other entities or agencies;
- Certificates of operating authority;
- Certificates of public convenience and necessity; and
- Public trust indentures or agreements.

Federal laws and regulations regarding potable water and wastewater came into being with the U.S. Public Health Service in 1914. The service set standards for bacteriological quality in potable water. This first act applied only to water systems that provided water to interstate carriers, such as ships or trains. The service revised and expanded the rules in 1925, 1947 and 1962. By 1962, the standards regulated 28 substances. Most of the 50 states adopted these standards with little modification.

In 1974, with concern over health issues, the U.S. Congress passed the Safe Drinking Water Act. Significant changes were made to this law in 1986 and 1996. This act translates into Tennessee state law as the Tennessee Safe Drinking Water Act of 1983, T.C.A. § 68-221-701. To further clarify the rules and regulations, the Tennessee Department of Environment and Conservation, Division of Water Supply, has developed Rules and Regulations 1200-5-1. These rules deal with public water systems.

In 1972, the U.S. Congress passed the Clean Water Act. It was enacted to eliminate the discharge of pollutants into the nation's waters and to achieve water quality levels that are fishable and swimmable. This act translates into Tennessee state law as the Water Quality Control Act of 1977, T.C.A. § 69-3-101. To further clarify the rules and regulations the Tennessee Department of Environment and Conservation, Division of Water Pollution Control, has developed Rules and Regulations 1200-4-1. These rules deal with wastewater systems.

Additional information can be found at the following Web sites:

- U.S. Environmental Protection Agency, http://www.epa.gov/
- Tennessee Department of Environment and Conservation, http://www.state.tn.us/environment/
- UT Municipal Technical Advisory Service, Municipal Handbook, http://www.mtas.tennessee.edu/

Self Regulation by Boards

The overall purpose of any public water system is simple: to make sure that its customers have safe, dependable, affordable drinking water. The overall purpose of a public wastewater system is to protect the public and the environment from the possible hazards of mishandled waste. Together these two

basic services facilitate economic activity and provide for the comfort and convenience of the users. In order to make sure that these purposes are fulfilled, a public utility system is overseen by a governing body called its "board." The board's power to regulate its own actions and its own members is an extension of the legal documents mentioned previously. As a governing body authorized by statute, the board is legally responsible for all aspects of the water system, including planning and development, management and operations, customer service, finances, and compliance with safe drinking water regulations and all other applicable laws and statutes. While federal, state, and municipal governments create laws that govern the operations of public utilities, they do not determine how these systems are managed. Boards are self regulating to the extent that they are responsible for establishing rules and policies that dictate how the board will operate and conduct its business.

WHAT DOES A BOARD DO?

A utility's governing board is granted responsibility for the "general conduct" of the utility. This means the board or council is granted the authority to take any actions it considers necessary to direct the operations of the system. Of course, to be valid, all actions must be legal under the legal statutes and documents that authorize and govern the operation of the particular system.

A water board's main functions are to:

- Define the mission or direction for the system;
- Provide safe, potable water and ensure proper treatment of wastewater;
- Develop rules and policies for operation of the system;
- Provide adequate funding for the system; and
- Oversee the management of the system.

To summarize, in addition to providing leadership, the board must perform the following functions: planning and developing, overseeing management and operations, directing the system's financial affairs, and ensuring that the utility complies with all water quality regulations. These are broad responsibilities that require general knowledge of business and personnel management as well as utilities. In addition to directing the system's affairs, the board must decide how to govern itself, including delegating responsibilities and conducting meetings.

One of the most important tasks a board will perform is to hire its manager. The board should hire a manager who can implement the policies and goals of the board. He should be technically qualified and have the people skills to effectively manage a publicly owned business. The manager is a very important person. He is the board's chief technical advisor, and, as such, the board should trust him completely and maintain good lines of communication.

The board should work with the manager to establish policies and procedures that enable the manager to hire personnel, construct and expand the infrastructure, make needed purchases, and generally to organize the enterprise for success. These policies and procedures establish the process within which the manager works. Not only do you need a good manager, but also a good process in order for the system to be successful.

The board is responsible for assuring the public that this publicly owned business enterprise is operated properly and that the money is spent wisely.

ADMINISTRATIVE DUTIES

Define the Purpose and Write a Mission Statement

The hardest but most critical responsibility of the board is to establish a direction or mission for the

utility. With a clear understanding of where the organization is headed, the board, manager, and employees will have a common goal to work toward, and there can be continuity from year to year.

The purpose of a water or wastewater utility is to enhance the well being of the community by protecting the public health and the environment and by facilitating the economic activity of the community. This is why the utility exists. The mission of the utility is what it does to fulfill the purpose. A mission statement is a general statement of what the utility wants to accomplish in order to fulfill the purpose of the organization.

The mission for a utility system can be stated quite simply: "Quality water service at a reasonable price." A second part of the mission statement could include "Continuously improving water quality and service." The first part meets customer needs, and the second part keeps customers satisfied. These two phrases establish a general direction, goal, or objective that all employees, managers, and board members can use as they make decisions in their areas of responsibility.

However simply the mission can be stated, implementing it is not easy. Part of what makes establishing and implementing a mission for a water system so difficult is that different groups want different things from your system:

- Customers want good-tasting and safe water, dependable service and low water bills;
- State regulators want compliance with regulations, a properly designed system and certified operators;
- Debt holders want prompt repayment of loans, sound financial operation and good system maintenance to protect their investment; and
- Employees want fair wages, good working conditions and job security.

One of a board's biggest responsibilities is to balance the various demands on the system. Is there a way to make balancing competing demands easier? There is no easy answer, and there is always the temptation to respond to whichever of these different groups is making the loudest demand at any given time. Responding in this way can lead to difficulty, however, if the board fails to consider how agreeing to the demands of one constituency will affect the others. To avoid making hasty or ill-considered decisions, it is worth spending time to develop a statement of mission that articulates the board's vision for the utility. Such a statement of mission will do the following:

- Provide a common basis for decision making;
- Help the board understand all its responsibilities; and
- Help keep the proper perspective while focusing on day-to-day problems.

The statement of purpose states the basic reasons for the system's existence. A clear statement of mission is like a compass. It helps keep all the day-to-day decisions pointed in the right direction.

Developing a written statement of mission that the whole board supports takes time and should be undertaken as part of several regular meetings of the board. Begin by asking each member of the board to draft a sample statement of purpose. Discuss each member's draft, trying to understand the differences. The discussion process gives the board a chance to form closer ties, share expectations for the future of the system, and better understand the differences among board members.

After discussing all members' draft statements, try to form a single statement of mission that is agreeable to all members. Don't expect everyone to agree right away. Remember that each member comes from a different background and has different

experiences. Don't bury differences of opinion about the purpose of the system. If differences are not settled, they will return later. More importantly, because differences of opinion come from a variety of experiences, it is likely that they will lead, ultimately, to a stronger and more realistic statement of purpose.

After a statement of purpose is drafted, allow time for members to think seriously about it and offer needed changes. Once a final draft has been agreed upon, offer it for final approval at the next regular meeting. Once the statement of purpose has been approved, use it as a yardstick for your board's decisions. Good decisions move the system toward achieving its broader purpose; poor decisions do not. The board should regularly review the statement of purpose to make sure its decisions are consistent with its purpose. At least once a year, the board should examine the statement to make sure that it remains true to the board's vision for the system.

This sample statement of purpose would be suitable for a small community water system. You may use it as needed.

STATEMENT OF MISSION FOR XYZ WATER OR WASTEWATER SYSTEM

The mission of XYZ Water System is to provide its customers with good-tasting water that consistently meets water-quality regulations.

The system will provide water to all its customers at a fair and reasonable price that reflects the full cost of producing, treating, storing and distributing it.

Service will be dependable, uninterrupted and operated in a businesslike way.

The mission of a wastewater system is to provide the customers with reliable service that meets pollution control regulations. The system will provide wastewater service to all its customers at a fair and reasonable price that reflects the full cost of collection treatment and disposal or reuse.

Implementing the Mission

Once the board has defined its purpose and created a statement of mission to clarify the mission, it must be implemented. It is best to follow a plan so that work can be done efficiently and effectively. Begin by establishing areas of responsibility, such as:

- Employee and customer relations;
- Management and finance;
- Operations and maintenance;
- Planning and development; and
- Regulatory compliance.

These areas can be combined depending on the size of the system. Once the areas of responsibility are determined, create a "committee of one" system in which each board member is responsible for one area. Boards that have many members could create larger committees. One or more members might have talent or experience that is best suited to certain areas. If the board cannot agree on who will oversee the various areas, an alternative is to rotate assignments, with each board member taking responsibility for a different area every few months.

Keep in mind that the member does not need to take direct action but is expected to become "expert" in the area in order to advise the board so that it can discuss and vote on needed actions. Once members are assigned areas of responsibility, the responsible member should execute a plan that includes the following four steps:

- Fact finding;
- Planning (setting objectives);
- Implementing; and
- Overseeing and reporting.

Fact Finding: Fact finding is the process of determining what exists now versus what should exist at some point in the future. In order to advise the full board, the member responsible for each area should learn what is being done in that area. Begin by asking the following questions:

- What is presently being done?
- What is not being done that should be done?
- What should be done better?

Planning: Planning is the process of setting goals and objectives to be achieved in the future. Based on what is revealed in the fact-finding step, objectives are developed for each area and recommended to the full board. Objectives should be concrete and measurable and should relate to the vision and the statement of purpose. It is important that these objectives be approved by the whole board so that there is full support for their implementation.

Implementation: Once the board has set objectives, the board member who is responsible for the area must make sure everyone is working toward those goals. During the implementation phase, it is important to answer the following questions:

- What exactly is going to be done to accomplish this objective?
- How is it going to be done?
- Who will do it?
- When will it be done?

Overseeing and Reporting: The last phase of the plan is overseeing and reporting. Between board meetings, the board member for each area is responsible for observing and evaluating progress toward the objectives that have been adopted by the board. The committee member should report that progress at each meeting of the board.

The advantage of putting such a system in place is that it keeps the board focused on goals that are clearly related to its mission. When individuals are made responsible for well-defined goals, it is easier to keep track.

Managing and Operating the System

There is a difference between managing the system and operating it. "Managing" refers to administrative duties such as planning, budgeting, policy setting, and all the tasks associated with implementing the plan, maintaining control of the budget and seeing that policies are followed. "Operating" refers to the technical tasks such as taking water-quality tests, repairing lines, doing preventive maintenance on equipment, and treating water with the proper chemicals. The members of the board are charged with overseeing all these functions, though not with actually performing the work.

Organizational Management: Organizational management involves how the decision-making body exercises its delegated authority in governing the utility. The board of directors, board of commissioners or city council is granted the authority and responsibility for governing the water system and for governing itself, as well. Many aspects of general organizational management of your utility are controlled by state law, articles of incorporation, charter, organization bylaws or certificate of incorporation. Refer to whichever documents specify what you are authorized or limited to do. Some of the Tennessee state laws that empower and affect municipal utilities include T.C.A. Title 6; Title 7-34, 35, 39, 52; Title 68-221; and Title 69-3.

Financial Management: The governing board of the system has the authority to set water rates, as well as to establish and collect other fees and charges. "Other fees and charges" include the tap fee or initial connection fee, a penalty for late

payment of water bills, a reconnect charge if service is disconnected because of nonpayment of bills, and so on.

Another major responsibility of the governing board is to borrow money. Usually, money is borrowed to finance construction of the system or to make improvements to an existing system. The board may pledge assets, issue certificates of indebtedness, pledge revenues, and issue mortgages or deeds in order to comply with the legal requirements of lenders. Chapter Two discusses these financial management issues in greater depth.

There can be significant liability associated with operating a utility. If customers become sick as a result of improperly treated drinking water or if waste is not handled properly there can be a risk of legal action. Management of this risk should be a motivating factor in governance of the utility.

Selection of Employees: The governing board is responsible for hiring and supervising the employees who actually operate the system. This is one of the most important responsibilities the board exercises. In very small systems, most of the operating and financial tasks of the system may be carried out by as few as two people. It is important that the people hired by the board have the ability, experience and training to perform adequately and effectively all tasks necessary to run the system on a day-to-day basis. In addition to hiring personnel, the board must decide how many people to employ, what those people will do, how they will do it and when it will be done. After employment, it is up to the governing board to decide whether the jobs are being performed properly. If not, the board must decide what actions to take to ensure it will be done right in the future.

Remember that employees are an extension of your board. How well the system is operated is a direct reflection on the governing board. Ultimately, the board is legally responsible for the operation and financial health of the system. This responsibility also applies to any consultants your system may need, such as engineers, attorneys or accountants. These consultants are "agents" of the governing body, and the board is responsible for the performance of their duties. For this reason, take the same care in selecting and hiring consultants as you take when hiring employees.

In very small systems, the only employees may be an operator and a bookkeeper and may be only part-time employees. Yet the same kinds of management activities needed for large systems with paid managers and staff must still be handled in a small system. The following section discusses in detail the roles and responsibilities of various utility personnel and agents of the board.

The Roles and Responsibilities of Managers: In a public utility the manager has the toughest role. He or she must have a firm grasp of both the general ideas and the details. The manager must implement the vision and direction established by the board in order to meet customers' needs. In short, the manager is responsible for the success of the utility, bringing together money and personnel to provide a service in a manner that is legal and ethical.

The manager is the board's chief technical advisor and liaison with the actual operation of the utility. As such, the manager must stay abreast of regulatory changes that will affect the system and must communicate effectively with the board about all aspects of the system. The manager must also assure the board that their direction is followed in a manner that meets the applicable regulations.

In some utilities, the manager, like the board, does little of the actual work, but directs other people. In other systems, the manager does all the work. A manager's most important skills are people

skills. After hiring personnel, the manager must communicate clearly the direction that the business is headed in and the way each individual employee's job is part of the overall enterprise. Employees also need to know the policies and procedures associated with their jobs, and the manager must provide appropriate training and tools for each worker. Finally, the manager must hold each employee accountable for performing his or her job but be able to recognize when a problem is the employee's fault and when it is a result of a problem with the system.

The manager needs a complete grasp of the financial situation of the utility and also an understanding of the things that affect finances. This includes being aware that taxpayers and rate payers have a stake in the efficient financial management of the utility. It also means recognizing that expenditures to keep the system operating efficiently can save costs in the long run.

A manager must work with the operators to establish and maintain local water quality standards. These may be simply to meet the state and federal standards, or they could be stricter. There should also be a standard of care set for the facilities and equipment. The budgeting process is a major part of the manager's job. Through the use of a capital expenditure plan, a manager can plan ahead for funds that will be needed for major purchases of facilities or equipment. To make a capital plan, the manager needs operators to anticipate how operational needs might change in future years. This may include expansion as water demand grows or simply a prediction as to when a piece of equipment will need replacing.

Besides the responsibilities listed in this section, a manager also is responsible for all of the certified operator's responsibilities. The manager must be able to obtain and retain staff with all necessary certifications needed to operate the system. The manager must have the ability to give guidance in any situation that may occur within the system.

The Roles and Responsibilities of Certified Operators: Certified operators should be able to operate the physical facilities in order to produce acceptable water quality. In the water or wastewater treatment plant, the operators should be in full control of all of the details of the treatment process and of all plant equipment in order to produce quality drinking water or wastewater plant effluent. The distribution operators should also be in full control of all of the details of the distribution equipment and facilities so that the quality of the water is maintained through the system and consumers receive a safe and aesthetically pleasing product. Collection system operators should construct and maintain a system that transports all wastes away from homes and businesses both economically and safely. Controlling the process is very important; operators should be in full control of the process no matter what happens. No water should be delivered to the public or discharged from the wastewater system unless it is totally safe. If this cannot be accomplished, the operator should prevent the delivery of unsafe water, fix the problem or notify management that there is a problem beyond the operator's capability, or make the appropriate arrangements to deliver safe water. Because the terms "quality" and "in control" are somewhat vague, the following discussion is offered to clarify the role of a certified operator.

The water utility's mission is to produce good quality drinking water or wastewater effluent at an economical price. Certified operators play an integral part in that mission because they handle the daily process of collecting and treating sewage and purifying and distributing the water. The operator's role is basically fourfold:

- Comply with regulatory requirements;
- Take care of the physical assets;

- Operate economically; and
- Plan for the future.

Compliance with the Regulatory Requirements: Drinking water must meet state and federal drinking water standards. These, however, are minimum quality standards, and operators should be encouraged to produce drinking water that is of higher quality than the minimum.

The first part of meeting the regulations is to know and understand the requirements. Operators should have a reliable source of regulatory information and be able to understand that material and put it to use. In most cases, this means they should be able to read and understand the Code of Federal Regulations, which applies to drinking water, and Tennessee's drinking water rules, found in the Rules and Regulations of the State of Tennessee Chapter 1200-5-1. On the wastewater side they should fully understand the NPDES Permit and the applicable Codes of Federal Regulations.

Operators should fully understand all equipment throughout the facility, how it works, and what effects its operation has on water quality. They should be able to manipulate the plant and its equipment in order to produce top-quality water under all anticipated raw water conditions and flow situations. They should know how to perform and interpret laboratory tests in order to optimize the purification process. Being in control of the facility means that no matter what the situation, rain or shine, hot or cold, high flow or low flow, broken down or not, the only water that leaves the plant is quality water.

Care of the Physical Assets: A second very important part of an operator's job is taking care of the physical assets: the pumps and motors, the concrete and steel, the controls and monitors. A failing facility has difficulty meeting water quality standards. In small plants, the operators themselves may actually perform the maintenance tasks; in larger plants there may be a dedicated maintenance staff. Either way, it is the operator's responsibility to make sure that needed maintenance is performed and performed correctly. The operator is responsible for making sure that equipment will operate reliably.

Maintaining the physical plant and machinery is justified economically as well. A utility has a large investment in infrastructure, and the longer the plant and equipment operate, the more economically water can be produced, resulting in greater savings for customers and improved position for the utility.

Operating Economically: The third area of responsibility of an operator is to operate the plant economically. Public utilities use ratepayers' and taxpayers' money to run the business, and it is the responsibility of all utility personnel to use this money wisely. Taking care of the infrastructure is part of this job. Other aspects of economical operation include using time wisely, making smart purchases and reducing waste. There are two major areas of waste that affect water and wastewater utilities. On the water side, unaccounted-for water represents an opportunity for improvement. On the wastewater side, inflow and infiltration of groundwater or storm water are very wasteful of utility and customer resources.

Planning for the Future: A final area of operator responsibility is to assist in planning for the future. Having plans enables the utility to be ready when a crisis develops. Plant operators should be able to advise management of the general condition of the system as a whole and of individual system components. The age and condition of tanks, pipelines, and plant equipment, as well as the utilization rate, should be evaluated and noted. Tennessee drinking water rules require that when a system reaches 80 percent of capacity, planning must begin for upgrading system capacity. Operators should be able to advise management

when there are bottlenecks in the system that need to be corrected. In order to present this type of information to management, operators should evaluate the operating data in the Monthly Operating Report.

The operating data, flow measurements, chemical feed and usage rates, chemical and bacteriological test results, and usage and leak volumes all constitute the treatment and distribution process. These data reveal both the good and the bad in the process. If utility personnel will listen to the message in the data, they can make informed and wise decisions about the operation of the system. Trend charting is an excellent way of presenting data to show what is happening to the process over time. A trend chart is simply a graph of a test parameter over time. For example, average annual or monthly flow can be graphed to show the changes in water usage over time. These graphs can be created by hand or on a computer. Another way to graph data is to use a control chart. The control chart will show whether a problem is due to lack of operator control or lack of plant capacity. Lack of control is generally a problem solved by operators, and lack of capacity is a problem that must be solved by management.

Certified operators are key personnel in the system. They are the ones who do the actual work. They produce the water, and they fulfill the mission that the board has established using the tools management has provided them. In order for them to be successful, they must have a clear understanding of the mission. They must know very clearly where the board wants to go, and they must be given the infrastructure, training and tools to reach the goals that are set. Without clear direction and support, success will be elusive. With a clearly articulated mission, support from management in the form of a good plant, training, and the proper tools and supplies, your operators should produce drinking water that is always safe, always available and always affordable. They should provide wastewater service that protects public health and the environment.

The Roles and Responsibilities of a Consulting Engineering Firm: Consulting engineers are in a service-oriented business. The top priority of the consultant is to supply needed information to clients. This information must be accurate and beneficial to the client. The services the firm provides will vary from firm to firm. The second priority of the consultant is to perform these services in such a way as to maintain a good working relationship with the client. This involves good communication between the consultant and the client or municipality. As long as the municipality is satisfied with the level of service it should continue to take advantage of the established good working relationship. Occasionally, a municipality may decide to change engineers. To do this they should invite several firms to submit their qualifications and select a firm based on those qualifications. We recommend following the steps in the MTAS publication *Qualification Based Selection: An MTAS Guide to Procuring Professional Engineering Services in Tennessee*.

Selecting a Professional Engineering Service

1. Before beginning the selection process, define the project.
   A. Know what you want to accomplish;
   B. Think through the project in detail;
   C. Know timetable constraints; and
   D. Have a budget in mind.
2. Begin the selection process with an invitation to firms to submit their qualifications.
   A. Mail requests directly to prequalified firms; and/or
   B. Use newspaper advertisements.
3. Do NOT select an engineer on the basis of lowest cost! Base your decision on qualifications. This method weighs professional services based on competence, creativity and performance first,

and cost second.

4. When reviewing qualifications look for:
   A. Technical qualifications;
   B. Experience with similar projects;
   C. Reputation with existing clients — call and check;
   D. The firm's current workload;
   E. Financial stability;
   F. The firm's ability to assure compliance of the finished project's performance; and
   G. Other factors specific to your project.
5. Select a committee (or use the entire board) to serve on the Engineering Selection Committee. Three to seven committee members are recommended.
6. The committee receives and reviews qualifications, develops a shortlist of the most qualified firms, and schedules separate interviews.
7. The Engineering Selection Committee hears presentations and conducts interviews with the selected firms (usually three to five firms). During the presentations, listen for and ask questions about the firm's ability to do the job, to stay within budget, and to comply with time schedules. Also ask about the qualifications of personnel the firm would assign to the job.
8. After the presentation, rank the firms in order of preference. (It is helpful for selection committee members to use a prepared score sheet.)
9. Next, begin negotiations with the top-ranked firm. If negotiations fail, go to the second firm, and so on. During negotiations ask:
   A. How long the firm will need to do the work;
   B. How the work will be phased;
   C. Upon what basis engineering fees will be established;
   D. What services are included in the fee; and
   E. Upon what basis extra work will be charged.
10. Fees usually are based on one of the following methods:
   A. Salary cost times a multiplier plus direct nonsalary expenses;
   B. Cost plus fixed fee;
   C. Lump sum; or
   D. Percentage of total construction cost.
11. When negotiations are finalized, draft a contract.
   A. Work with the city attorney to draft the contract. Or, if the engineer drafts the contract, carefully review it with your attorney;
   B. Be sure that the contract has a definite statement of work, sum to be paid, method of payment and a termination clause;
   C. Be aware of owner responsibilities under the terms of the contract.
12. It is very important to manage the project all the way through.

Please call MTAS for help with any of the above steps. There also are numerous Web sites available to assist in the qualification-based selection process. A simple search with the phrase "qualification-based selection" or "QBS" will return many sites. Two such sites are: http://www.ctqbs.org/ and http://www.meqbs.org/qbs_council1.htm

The Roles and Responsibilities of an Attorney:
The city attorney is a vital resource for the board. Before proceeding with any business that requires contracts, addresses personnel problems, involves state or federal laws, and other items, the board should obtain the opinion of the city attorney. The attorney is the individual who strives to keep the board's action legal and ethical. If your attorney is unavailable, contact your MTAS management consultant with your question.

COMMUNICATING THE MESSAGE

The Importance of Public Relations

All public water and wastewater systems MUST communicate with their memberships. Not only do customers want to know what is occurring with their utility, but it's the law. The 1996 Amendment to the Safe Drinking Water Act requires all public

water systems, regardless of size, to inform their customers of the content of their water. However, good public relations efforts communicate much more information than required by this law.

Public relations, or community relations, uses communication as a tool to link the water system to its customers. A community relations program can increase the public's awareness and create a positive image for the system. Developing and maintaining a positive public image takes time, however.

Community relations is an ongoing process. Once the system gains the support of the community, board members must work hard to keep that support. If the board has gained the community's approval, the community is much more likely to support the utility during new projects, rate hikes and disasters. Also, negative news will not affect the water system as much if the community has a favorable attitude toward the system.

Utility systems exist to provide a necessary service to your community. But providing utilities to a community is a complex, expensive process that many consumers do not understand. In order to provide these services efficiently, the system must use public relations to:

- Build a relationship between the system and the community;
- Improve communications between system employees and customers;
- Strengthen the relationship between the system and the local government;
- Educate the community about the importance of water, water use and water conservation;
- Minimize rumors and other negative news or information; and
- Provide emergency instructions.

Gaining Community Support

A water system should strive to gain and maintain its community's confidence and support. As with any other aspect of managing the system, it is important to develop a communications plan. Otherwise, the utility may be spending time and money doing things that don't help achieve desired goals. The following questions should be considered at the beginning of any public relations effort:

- What audiences does the utility want to reach?
- What messages should be communicated?
- How should the messages be delivered?
- When should the messages be delivered?
- What methods should be used to deliver the messages?

The water system should use the following steps to develop an effective public relations program:

- Clarify the mission;
- Analyze the current situation;
- Develop goals and objectives;
- Conduct a communications audit;
- Identify communication resources;
- Identify target audiences;
- Develop strategies for reaching target audiences; and
- Finalize the communications plan.

Implementing the Public Relations Program

Clarify the Mission: The process begins with a review of the utility's mission. Before any effective communications planning can take place, all board members and employees must have a clear understanding of the system's mission. If your system already has a mission statement, it should be reviewed and, if necessary, revised before beginning to develop a communications plan. If there is not a mission statement, developing one should be the first step.

Analyze the Current Situation: A utility needs to have an excellent public image within the community in order to accomplish its goals. If the system maintains a positive image, the community most likely will support it when major improvements and purchases are needed. Customers will be more likely to understand that the changes are necessary to maintain high-quality service.

Customers must view their charges as fair and accurate. They must believe the water system's employees are qualified, knowledgeable, competent, friendly and polite. They also must know that the board of directors operates the water system in a professional manner. They must believe that the utility system communicates well with them.

The first step in analyzing the situation is to determine what the public already believes about the system by soliciting opinions on the system's perceived image. What are the different elements of the utility's public and how does each of them perceive the system? How close is the public's view of the system to the image the system wants to project? Once the public's view of the water system is determined, it is possible to formulate goals and objectives that will enable the system to communicate effectively with its audiences.

Develop Goals and Objectives: In light of the mission statement and the situation analysis, the system should develop its major goals and the objectives. Goals are general outcomes desired (where you want to go); objectives are specific means of achieving the goals (how you get there).

Goals are the direction the public relations program will take. What does it want to accomplish? The water system must stay focused on its major goals, such as raising awareness of the system, having an excellent image in the community, and providing excellent service.

Objectives are helpful for monitoring progress. If the water system has a clear idea of its game plan, it can look back later to see if it has been achieved. Objectives must be specific, achievable and measurable. Make sure that your system does not set objectives that cannot be reached. The four-fold operator role mentioned earlier may serve as a starting point for establishing objectives.

The board should include both short-term and long-term objectives.

It may be necessary to develop many small "stepping stones" to aid in accomplishing long-term objectives. Accomplishing these stepping-stone objectives will help keep motivation high.

Conduct a Communications Audit: Before developing a communications plan, it's important to review what the media and the community are currently reporting about the utility. By conducting a communications audit, the utility can determine if the news is negative or positive, which media outlets cover the water system on a regular basis, and how accurate the reporting is. A simple method for doing this is to clip and save news articles, and videotape any relevant TV segments.

Identify Communications Resources: The next step is to describe current communication resources. Resources include human resources, financial resources, physical resources, media outlets and other resources. Reflect on the following questions in light of your current public relations efforts: Who is communicating? What is the budget for communications? What members of the media are available to communicate the message to the public?

In order to avoid sending conflicting messages from more than one person, it is important to identify the best spokesperson for your system. The spokesperson must possess excellent communication

skills. The person must be friendly, visible within the community, well respected and well read. To a certain extent, the way the community views the spokesperson is how the community will view the water system.

Although some water systems are large enough to employ a team of public relations specialists to handle communications, many small water systems do not have employees with backgrounds in public relations. Employees who were hired to handle operations probably do not have time to handle a community relations program. In such situations, it is the board's responsibility to oversee development of the plan and to select and supervise the staff that carries it out.

If the system cannot hire a public relations professional, a volunteer (often a retired individual) may be used who has relevant experience with public relations. One possibility for locating appropriate candidates is contacting area civic groups and churches. It also is possible to find outstanding students in nearby community colleges or universities to serve as public relations interns. The students gain valuable job experience while the water system benefits from the students' skills. The board should ask candidates for references and samples of previous work. No matter who is selected to handle public relations, that person should be experienced and knowledgeable because the water system's credibility and image are at stake.

Identify Target Audiences: The next step is to identify the various target audiences or stakeholders. Each group requires a slightly different communications approach and must be considered separately. Identify the reasons to communicate with each target audience and what should happen as a result of communicating with them. Be specific.

Assess the Water System's Current Image Among Customers: Before undertaking a public relations program, it is important to have an accurate perception of how target audiences view the system. There are several methods a water system can use to learn its customers' views, including informal personal interviews, telephone interviews or surveys and written surveys.

Informal contacts. One way to get information is to ask people what they think of the utility service. Often customers, as well as others, will respond more openly in an informal situation when asked their opinion.

Surveys. A second way to learn the audience's views of the water system is through a customer survey. A survey may be distributed in written form or conducted by telephone. When conducting an interview, remember to use telephone etiquette. Once the information is compiled and reviewed the survey can provide basic information on how customers currently view the water system. A well-designed survey can be used for several years for budgeting, planning and customer relations.

Develop Strategies for Reaching Target Audiences: Once target audiences have been identified and communication objectives have been determined, it is possible to develop specific messages to achieve communications goals. The first step should be to write the exact message for each audience. Then, based on understanding of the audience, its habits for receiving information, and the desired objectives, it is possible to select the form of communication best suited to a particular target audience.

Some goals for communicating with a target audience:

- Inform people (create awareness or increase their level of awareness);
- Influence people's attitudes (reverse unfavorable attitudes or strengthen favorable attitudes); and
- Influence people's behavior (reinforce or change their commitment to act).

Generally speaking, four forms of communications can be used:

- Mass media (including news releases, TV, radio);
- Targeted media (including direct mail, periodicals, newsletters);
- Community and social gatherings (including public meetings and special events); and
- One-on-one contact (including personal visits and personal phone calls).

Also, newer technologies, such as teleconferencing, interactive video, CD-ROM, and the Internet, can play a role in a communications plan.

Using Written Communications

The water system may use many forms of written communication to get its message to the community it serves.

Information Sheets: Basic information includes the history of the system, water sources, and the amount of water produced. Tips on water conservation and other topics would be of interest to many customers. The American Water Works Association (AWWA) and the Water Environment Federation (WEF) provide many low-cost informational pieces ("bill stuffers") that could be included with water bills. The addresses are included in the References section.

President's Letter: The president of the board may want to write a letter that includes the present status of the water system as well as future expectations. Major accomplishments also can be listed. All that is required for this low-cost promotional item is letterhead and a message.

Brochures: Another way to spread the water system's message is through the use of brochures. A brochure can answer frequently asked questions, provide a checklist for new customers, inform customers on how to read a bill, or provide information on how to turn water service on or off. Another brochure could be used for a water-quality report, now required by law. The report could include water test results as well as provide information about the water source.

Newsletters: A customer newsletter can be a valuable tool for the water system. It's an excellent way to update customers on construction projects, utility rate information, new employees, or community events.

Press Releases: A press release is a short news article about a particular newsworthy event. Information about rate increases or interruption of service are good examples of the types of information you should include. All releases should include some basic information: the name, address, phone number, and a contact person for the water system, along with the who, what, where, when and why of a particular news item.

Consumer Confidence Reports: All public water systems, regardless of size, must provide their customers with a consumer confidence report. This report is required by the 1996 Safe Drinking Water Act Amendment. Although required by law, the report gives a water system an excellent opportunity to improve its community relations program. A consumer confidence report should include the following information:

- The source of the system's water;
- A list of all contaminants for which the water system tests;
- A list of the contaminant levels found in the water;
- Any violations of contaminant levels;
- The health concerns of the exceeded levels; and
- Definitions of terms.

A consumer confidence report can include information about improvements that have been made and future projects of the water system. A system also can tell its customers about its goals and can stress that it is providing clean, safe water.

Using Spoken Communication

Spoken communication can be through informal, one-on-one contacts, or it may be through formal presentations at public community meetings.

Presentations: A speech should always be appropriate for the audience. For example, customers might be confused by highly technical terms, but an audience of engineers would expect a speaker to use them. When talking to customers in an informal setting, it is acceptable and often preferable to sit while speaking to them. On the other hand, when giving a formal presentation to a group, it is appropriate to stand when speaking. It is important to remember that appearance, hand gestures, eye contact and facial expressions are all part of the message.

Telephone Contacts: The first contact the water system has with a customer can form a lasting impression of the utility service. Using the following tips while making telephone contacts should help ensure a positive image of the water system:

- Answer the phone in a timely manner, usually within four rings.
- Have customer-friendly voice mail.
- Identify yourself to callers.
- Use the caller's name. Jot it down if necessary.
- Listen closely to the other person. The caller's tone of voice can indicate his or her state of mind.
- Concentrate on the call. Eliminate distractions; do not conduct side conversations.
- "Smile through the phone." This technique projects a pleasant tone.
- Ask permission before putting a person on hold. Never keep a caller on hold for extended periods; keep the caller informed of your progress.
- Don't make the caller feel that he or she has interrupted you.
- If you tell someone you will call back, make sure that you do.
- Thank the caller.

Working with the Media

The media can be a powerful resource for a water system. Most people watch television, listen to radio or read a newspaper. When using the media, make sure the story is interesting and has an effect on the community.

The water system's spokesperson should build a strong relationship with members of the media. A water system is only as good as the community views it to be. To build a strong rapport, the water system community relations spokesperson and the media must trust and respect each other.

Make sure the system's spokesperson presents a professional image when being interviewed. In an interview, the spokesperson must be prepared, speak in everyday language, not use technical terms or jargon, and answer questions fully and truthfully. If the spokesperson does not know an answer, he or she should admit it and offer to find out the answer. Never argue with a reporter for any reason.

Communications between Customers and the Water System

Customers are important to the water system because the water system cannot operate without them. Because customers are so important, a water system should keep its customers informed about changes that will affect them. Treating new customers well will make a positive first impression. In providing exceptional service to new customers, the groundwork is laid for a good lasting relationship.

Employees and board members of the water system should understand the mission and the image the system wants to convey. Customers see employees on a day-to-day basis. Employees should dress professionally and abide by safety regulations. Employees, as well as board members, should be knowledgeable about the system and should be able to answer simple questions by people in the community.

THE IMPORTANCE OF CUSTOMER SERVICE

The most important people in the world to a water system board member are the water system customers. The primary reason a water system exists is to provide water service to its users, who in turn provide the income to the water system to cover the costs of delivering the service.

Responding to Customers

Dissatisfied customers can hinder the effectiveness of the water system. A survey completed by the Department of Consumer Affairs discovered that approximately 70 percent of customers would support the system if it solved their problems to their satisfaction. In most instances, the customer needs only to be informed about the situation and given specific information about a plan to resolve it.

Most information is spread by word of mouth. Customers who have had a bad experience and who remain dissatisfied with the water system will normally tell 11 other people. Each of these 11 individuals will usually tell five more people. Obviously, a snowball effect can occur from just one dissatisfied customer. This one bad experience can result in about 67 negative impressions of the water system. Pleasant experiences do not have the same effect. Only about half as many customers tell others about their good experiences. In general, a very good experience will lead a customer to spread the information about the service to approximately five others. These five individuals then tell at least two more. People take good service for granted. Customers expect consistent, excellent service.

Customers with bad experiences will not support the system, hence a water system must strive to maintain excellent customer service. A water system that provides excellent customer service will maintain a good image because of excellent word-of-mouth comments from customers. Handling disgruntled customers tests a system's customer service expertise.

Skills for Building Good Customer Relationships

Board members set an example for the water system to follow. To be an effective board member, it is important to develop skills that lead to good customer service relationships with water system users. These skills include:

- Possessing a positive, caring attitude;
- Communicating effectively;
- Satisfying customers; and
- Following up on problems.

Positive Attitude: While it is impossible to eliminate all problems with water system users, it is important to keep a positive attitude and to let customers know they are important. The attitude that customer service skills are needed only when dealing with difficult customers and complaints can lead to problems. Customers may contact the water

system for reasons other than to complain. They may want information about the water system or to offer suggestions. Some may even call to offer thanks for excellent service.

Effective Communication: The second skill necessary for maintaining excellent customer service is effective communication. A board member's job is to serve the water users. Effective communication begins with listening. It is important to listen with an open mind to complaints, as well as to questions and suggestions. Communication is a two-way process between the board and the system's users.

One way to communicate with customers is through the communications strategy plan. Maintaining regular contact with water system users through "bill stuffers," newsletters, and press releases builds support for your water system with the community.

Customer Satisfaction: The skill needed to maintain exceptional customer service is the ability to satisfy the customers. Water system users look to board members to help them solve their problems. It is important to be able to do the "right things right the first time." Most customers will forgive and forget if their problems are resolved quickly. Customers become irritable when their problems take a long time to be resolved.

From time to time, board members will encounter dissatisfied, even irate, customers. Some customers complain only about serious problems, while others complain about even minor misunderstandings. New board members may inherit negative attitudes from some customers.

A customer should never be allowed to think that a board member is unconcerned with his or her problem, and the board member should never deny that a problem exists. That will only make the situation worse. If a customer thinks he or she has a problem with the water system, then the board has a problem. If a customer becomes irate, remain calm and let him or her cool down. The customer's anger and frustration probably have built up and may actually be making the problem seem worse than it is. Once the anger is eliminated, a customer's complaint usually becomes merely a request. Cool heads usually prevail over ill-tempered ones.

Follow Up: A customer must feel that customer satisfaction is one of your top priorities. It is essential to follow up after a customer initially contacts you with a problem. After the first contact, send a letter that outlines the details of the agreed-upon solution then follow through on what was promised. After about a week, call to see if the customer is satisfied with the results. The customer should be reassured that the board appreciates his or her patience. Mention that you are available whenever problems or questions arise.

Always strive to deliver fast, dependable service, but when that isn't possible, customers should be informed. Emergency situations sometimes arise that prevent prompt attention to problems, but customers usually understand if they are told the truth and know what to expect.

For customers who make unrealistic requests, offer alternative solutions. If the solution cannot be handled in a timely manner, at least keep the customer informed about your progress. Always be honest with customers. Never make promises you cannot keep. Broken promises only create more problems.

Applying the Golden Rule: Customer service skills are easy to master if you put yourself in the place of the customer. Keep this in mind: How do I want to be treated? Almost everyone likes to be treated as though he or she is the most important person in the world.

Valuing the System's Customers: The following principles should be followed when dealing with customers:

- Make customers feel welcome in the utility office, at board meetings, and at other water system functions;
- Make customers feel important, and let them know you respect them;
- Give consideration to customers' ideas and suggestions;
- Listen carefully to customers' problems to understand their points of view;
- Don't let anything interfere with your serving customers;
- Ask nonthreatening and nondefensive questions about their problems;
- Give customers the individual and undivided attention they deserve;
- Don't take it personally when customers are unhappy; they are attacking the quality of the water system's service, not you;
- Be a partner with customers in solving their problems;
- Get to know customers by their names;
- Ask what would satisfy them in solving their problems;
- Correct their problems as quickly as possible;
- Apologize to customers for their inconvenience;
- Reassure customers by letting them know you are dedicated to customer service; and
- Thank customers for their input.

Situations for Using Customer Service Skills

Utilities should inform their users when the water or wastewater service may be changed or affected. Explain that the reason for the changes is to improve the overall quality of the current system. Good customer service skills benefit a board member when dealing with the following situations:

- Unhappy customers;
- Interruption of water service;
- Repairs to the water system;
- Changes in taste or pressure;
- Rate increases;
- Unusual findings from testing;
- Collection of water bills;
- Water rate disputes;
- Water leaks;
- New projects;
- Construction-related inconvenience; and
- Construction-related damage to customer property.

Precautionary Measures

Take precautionary measures to establish open communication with water system users and help prevent future conflicts. The following preventive measures can help ensure high quality service for water system users and prevent misunderstandings:

- Provide users with a rate/price list and a schedule of billing dates, late charges, and cutoffs. Include connection and reconnection fees;
- Provide users with costs and income estimates used in setting water rates;
- Establish a convenient location for payments;
- Attend training for board members and employees on dealing with difficult people;
- Inform customers of procedures used to meet legal requirements for providing safe water;
- Have written policies available to customers for the priority of water system jobs and repairs; and
- Provide customers with procedures for filing complaints and contact names and phone numbers.

A GUIDE FOR CONDUCTING BUSINESS AT BOARD MEETINGS

Some of the major frustrations that board members feel often are related to simple and basic problems of conducting business. Complaints about wasting time, not being informed, meetings taking too

long, not knowing exactly what decisions have been made, important issues not being discussed, and an uneasiness about the way the board operates are all too prevalent among water systems. The keys to effective business meetings are knowledge of the bylaws, knowledge of established written rules for conducting business, a properly prepared agenda, and informative and well maintained minutes.

The bylaws contain the major purpose of the system and rules for making operational decisions but usually offer no help in formalizing procedures for conducting meetings. Procedural rules for conducting meetings can be found in a number of places. At the end of this section is a brief summary of procedural rules. An agenda is a list of business to be discussed during the meeting. Finally, minutes are a record of what actually occurred during the meeting. Each of these is discussed in greater depth in this section.

The president or chair of the board has the major responsibility for conducting meetings, but the president or chair should not have to establish the rules of conduct. These rules should be established and adopted as part of water system board policy so that any board member conducting a meeting will follow the same rules.

Scheduling Meetings and Notifying Members

Schedules and agendas for annual meetings and special meetings are prescribed in the bylaws, but regular board meeting procedures usually are not included. Annual meetings of nonprofit associations are required by law. Monthly meetings are advisable for any utility board. Meeting once a month is usually not overly burdensome, gives board members the opportunity to become better acquainted with the working environment, and provides for consistent and regular oversight. Ideally, the schedule of regular board meetings should be prepared a year in advance, or for as long a period of time as is practical. Whenever possible, meetings should be scheduled for the same week of the month and the same day of the week so that they are easy to remember and board members can fit the meetings into their personal and professional schedules. Changes in the schedules may be made as they become necessary.

For regularly scheduled meetings, the board should establish a policy to notify board members of the date, time, and place of the meeting by first-class mail a week (or a specified number of days) before the meeting and to follow up with a phone call one to two days before the meeting. Many water system boards have so few members that notification is essential to ensure that a quorum will attend. Usually, the impetus for notification comes from the president or chair, who often asks the secretary to mail the notices and make the calls. For some organizations or associations, the president calls directly to help ensure board members will attend the meeting.

Preparing an Effective Agenda

A properly prepared agenda, sent to board members before a meeting, outlines the nature of the business to be conducted. This agenda allows members time to prepare for the meeting and helps ensure that business will be conducted in an orderly and efficient manner. Agendas for the annual meetings of associations often are outlined topically and set in the bylaws. A typical agenda for annual membership meetings will have the following elements:

1. Call to order and proof of quorum;
2. Evidence of notices of meeting;
3. Reading and approval of minutes;
4. Officer and committee reports;
5. Election of directors;
6. Unfinished business;
7. New business; and
8. Adjournment.

A proof of quorum and evidence of meeting notices are necessary to verify that legal meetings are held and that the association is following its own bylaws. The board should take the approval of the minutes seriously because the minutes provide the only legitimate record and proof of the board's business decisions. At most annual meetings, at least one or two board members are elected, depending on the rotation defined in the bylaws. If there is unfinished business from a previous meeting, it must be considered before new business is conducted. A business meeting officially ends when a motion is passed to adjourn the business meeting.

Agendas for regular meetings of the board should not be overly detailed, but they should include sufficient detail for board members to know the exact business to be discussed at the meeting.

An example of too little detail:

1. Needed repairs
2. Replacing a pump

This could be clarified by changing the agenda items to

1. Spending $2,000 for repairs on the line from Flynn Road to Knarl Hill
2. Spending $8,000 to replace the pump at well 1 on Knarl Hill

The president, the manager, or a designated board member should develop the agenda and send it to board members in time for them to think about the topics, gather information if necessary, and prepare for the meeting. Boards need an approved policy that sets a deadline for adding agenda items. Before the agenda is set, the manager, the operator, and all board members should be consulted to decide which items should be reviewed. The manager usually is responsible for contacting the operator and presenting to the board any items from the operator. Agenda priorities should be set only after this is done. The agenda should be changed only if emergencies occur after it has been distributed. The president or chair should check with committees before the agenda is set to determine which committees will report.

Using a Consent Agenda

A consent agenda can be used to improve the efficiency of a business meeting and to reduce the time required to conduct a meeting. A consent agenda is an agenda pulled from the regular agenda based on items that require action but are not thought to need further discussion. If a board member wants to discuss an item that has been included on the consent agenda, then that member can request that the item be moved from the consent agenda to the regular agenda for discussion. Before removing the item from the consent agenda, the president or chair may ask if the question can be quickly answered or the problem quickly resolved. If this can be done, the board member may then allow the item to remain on the consent agenda. A consent agenda prevents wasting time on matters that have already been reported, discussed and evaluated, or that have been fully explained in attached written documents. Decision making is a mere formality on a consent agenda. All consent items are blocked together and voted on in one motion.

For example, the consent agenda on the following page was developed from the regular agenda.

AGENDA

1. Call to order
2. Declaration of quorum committee
3. Approval of minutes
4. Finance committee report: income, expenses, balance
5. Operations and maintenance report: compliance update, location and severity of leak repairs, recommended improvements or scheduled maintenance
6. Publicity committee report on news release
7. Payment of bills, contracts, and bids
8. Purchasing new pump for Knarl Hill well
9. Replacing lines from Flynn Road to Knarl Hill
10. Complaint by Mr. Jones about service to his area
11. Adjournment

CONSENT AGENDA

1. Approval of minutes
2. Acceptance of publicity report

Approving the consent agenda first would eliminate time spent individually on the items in the regular agenda.

Taking and Reviewing Minutes

Minutes are the legal record of board actions. Taking minutes and reviewing minutes are serious responsibilities. Recording accurate minutes is necessary for the proper functioning of the water system board. Minutes confirm precisely what business was conducted by the board and may provide critical evidence of board decisions. Approving minutes from previous meetings offers board members the opportunity to verify activities. Approved minutes are evidence that required and needed activities of the water system have been conducted. Poorly kept minutes can leave board members more vulnerable to criticism and legal actions.

Several precautions can be taken to reduce the possibility of errors in the minutes. During a meeting, the secretary should sit in a position where proceedings can be heard and understood. If questions arise, the secretary should immediately ask for clarification. Some secretaries prefer to take notes, tape the proceedings, and then use the notes and the recording to develop the first draft of the minutes.

Minutes should be sufficiently detailed to provide the important aspects of the meeting but not so detailed as to record every comment made during the meeting. Any other means of disposing of a motion must also be recorded. Actions made as a result of telephone conferences or other decision forums must be recorded in the minutes.

Copies of the minutes should be distributed to board members for review as soon as possible after the meeting. If distribution is delayed, members may forget details of the meeting or lose notes from the meeting. The meeting time can be reduced by sending copies to board members for their approval before the next meeting. The minutes usually can then be approved quickly, and reading and correcting the minutes can be avoided.

Minutes should:

- Give the nature of the meeting: regular meeting, special meeting or emergency meeting. If the meeting is a special meeting, the reason and purpose of the meeting should be specified;

- Give the time, date and location of the meeting;
- List the names of board members who are present and who are absent;
- List, in order of occurrence, the matters discussed, the actions taken, and votes on the actions;
- Include the precise wording of the motions made, who made the motions, who seconded the motions, and votes on the motions by each board member present;
- List the time, date and place of the next scheduled meeting; and
- State the time the meeting was adjourned.

Rules for Making Motions

Any organization that has frequent meetings and heavy business loads should adopt policies about the way business is conducted. Most organizations follow *Robert's Rules of Order*, which are old, well established, and comprehensive. The Web site http://www.constitution.org/rror/rror--00.htm contains a public domain copy of *Robert's Rules of Order Revised*. MTAS also has a guide entitled "How to Conduct a City Council Meeting Based on *Robert's Rules of Order*." Contact the MTAS library for a copy. Whether *Robert's* or some other system is used, the procedural rules should be specified in the bylaws. Being knowledgeable about all the rules requires extensive study. Water boards may outline a short set of rules for conducting meetings, but this set of rules must not conflict with the bylaws. The short set generally can be developed from the more extensive rules without conflicting with them. These rules should be written and adopted by the board as a policy of the organization. However, one member of the board should be sufficiently familiar with the full set of rules to act as the authority when disagreements about rules arise.

Following is an example of a set of rules for making motions:

1. The president or chair is responsible for presiding over business meetings and following the rules of the organization regarding motions.
2. A member is recognized by the chair when no other business is on the floor. The member then presents the motion.
3. Another member seconds the motion. If there is no second, the motion dies.
4. If there is a second, the motion is restated by the chair as written by the person making the motion or as written by the secretary. Any motion made and seconded must be written to ensure accuracy. Often amendments are not necessary if the board member making the motion includes sufficient detail, such as what is to be done, who is to do it, how much is to be spent, and when it is to be done.
5. The chair calls for discussion. The board member making the motion is entitled to be recognized first. Each member may make comments twice but is allowed the second comment only after all others have had the opportunity to comment once. Discussion is limited to three minutes per comment unless the chair decides that discussion can be extended. If there is no discussion, the chair may call for a vote.
6. An amendment to the motion can be made when a member is recognized by the chair and another seconds the amendment. Discussion follows in the same order as for a regular motion. The amendment is voted on first, then the motion is voted on. If the amendment is passed, the motion is voted on as amended. If the amendment does not pass, the vote is on the original motion. Amendments and amended motions when restated by the chair must be in writing.
7. When a vote is called for, the vote is announced, and the exact motion and the vote by each member are recorded in the minutes.

8. If a member is disruptive and refuses to follow rules, that member may be asked to leave. If the member refuses, charges of disturbing the peace may be brought.
9. If the chair does not follow these rules as prescribed in the policy of the board, members may ask for a procedural explanation from the chair. The president or a board member designated as parliamentarian is responsible for ensuring that a copy of these rules is available at every meeting. Each board should select a board member to be the board parliamentarian and have the responsibility of ensuring that the board follows correct procedures.

Other Rules

Other basic rules may be incorporated if they do not conflict with nonprofit corporation laws or the bylaws. Examples of other basic rules that might improve meeting efficiency are:

1. The time, date and location of a regular meeting must be posted in a public location known by water system users.
2. The president must contact all board members to seek their input before developing a final agenda for a regular meeting.
3. The agenda for a regular meeting must be distributed to the board at least two days before each meeting.
4. Any member user who wants to discuss a problem or an issue before the board must contact the president of the board at least three days before the meeting or before the agenda has been distributed to receive permission to address the board. The president has the option of approving or not approving the request. If approved, the item is added to the agenda.
5. The president or chair must follow the agenda as if conducting a regular meeting.
6. All board members must follow the bylaws, the rules established for making motions, and all other policies approved for the water system board.
7. The minutes of a meeting must be sent out for correction no later than one week following a meeting; board members must make comments and corrections no later than one week before the next meeting so the secretary can make the changes before submitting final copies for approval at the next board meeting.

These ideas are submitted to help water system organizations improve the way they conduct business. Each organization has its own strengths and weaknesses in this area and will have a plan that fits its particular needs in making effective decisions.

PARLIAMENTARY PROCEDURES AT A GLANCE

TO DO THIS	SAY...	INTERRUPT SPEAKER?	SECOND REQUIRED?	DEBATABLE?	AMENDABLE?	VOTE REQUIRED
Adjourn the meeting	I move we adjourn	No	Yes	No	No	Majority
Recess the meeting	I move that we recess until...	No	Yes	No	No	Majority
Complain about the noise, room, etc.	Point of privilege	Yes	No	No	No	None
Postpone consideration of a matter	I move we postpone this matter until...	No	No	Yes	Yes	Two-thirds
Suspend further consideration of a matter	I move we table it	No	Yes	No	No	Majority
End debate on a matter	I move we postpone this matter until...	No	Yes	Yes	Yes	Majority
Have a matter studied further	I move we refer this matter to a committee	No	Yes	Yes	Yes	Majority
Amend a motion	I move that this motion be amended by...	No	Yes	Yes	Yes	Majority
Introduce business (a primary motion)	I move that...	No	Yes	Yes	Yes	Majority
Object to a procedure or to a personal affront	Point of order	Yes	No	No	No	No vote required; Chair decides
Request information	Point of information	Yes, if urgent	No	No	No	None
Ask for vote by actual count to verify voice count	I call for a division of the house	No	No	No	No	No vote required unless someone objects
Object to consider some undiplomatic or improper matter	I object to consideration of this question	Yes	No	No	No	Two-thirds
Take up a matter previously tabled	I move we take from the table	No	Yes	No	No	Majority
Reconsider something already disposed of	I move we reconsider our action relative to ...	No	Yes	Yes, if original motion is debatable		
Consider something out of its scheduled order	I move we suspend the rules and consider	No	Yes	No	No	Two-thirds
Vote on a ruling by the chair	I appeal the chair's decision	Yes	Yes	Yes	No	Majority negative vote to reserve decision

Chapter 2: Financial Issues

FINANCIAL CONSIDERATIONS OF A WATER SYSTEM

A public water system has many important functions. These functions are all tied together with finances. Having a sound financial operation is imperative for the water system to produce and distribute water that meets or is better than state and federal requirements. The important areas of consideration are:

- Budgeting;
- Establishing and maintaining records;
- Revenues, including rate setting;
- Grants and loans; and
- Regulatory requirements.

Budgeting

An important part of managing any water system is planning. On the financial side, planning is most often accomplished through the use of the budget. There are two primary budgets the water system will use. One is the operating budget, which sets expected revenues and anticipated expenses of the system. The other is the capital budget, or capital plan, which sets out the timetable and projected costs of the water system. Both budgets are tools that, if properly used, will enable the management to make sound financial decisions.

Operating Budget: The operating budget is divided into two main areas: revenues and expenses. Revenues consist of anticipated monies from customer billings for water and sewer service sold to them, various customer service charges, tap fees and any other miscellaneous sources of funds. The best guide to budgeting revenues is to look at past history. What have our revenues been over the last several years? Absent major changes, water revenues are usually pretty consistent from year to year. Other considerations would be new customer growth, a large customer coming into or leaving the system, any changes to rates or fees, etc. Expenses also usually tend to be fairly consistent from year to year with the expected increases due to inflation. Expense items consist of employee salaries and benefits, chemicals, insurance (property, liability, etc.), office and computer supplies, interest on debt, routine repairs and maintenance, vehicle and equipment expenses (oil, gas, repairs), permit fees, and depreciation. Knowing the anticipated expenses will make it easier to adjust revenues to meet the water system's needs. The budget can be updated each month as revenues and expenses are recorded, and management will be able to determine how the system is doing financially on an ongoing basis instead of waiting until year end.

Capital Budget: The capital budget consists of a projected schedule for completing the improvements, expansions, and purchases of equipment that have a useful life of longer than one year. Capital projects include building new pipe lines, erecting new water tanks, replacing or building a treatment plant, and purchasing vehicles and large equipment items such as backhoes, pumps, etc. Three things are needed to create the capital budget: capital items the system needs to complete or purchase, the estimated costs, and a time frame for completion. Capital budgets generally cover a three- to five-year period with annual updates. Management needs to work closely with the utility staff and engineers to finalize the capital budget. Again, the capital budget helps the water management understand revenue needs as these items are not part of ordinary expenses but must be paid for by water system profits or through grants and loans.

An important part of the budget process should be establishing a reserve fund to pay for unexpected emergencies that arise as a part of the water operation. The water budget would allocate a set amount to be placed into the fund each month until the reserve is built or replenished.

Again, it is important to view these budgets as tools that will assist the water management in planning for the long-term viability of the system.

Establishing and Maintaining Records

It is important for the water system to maintain good records. Public water systems are entrusted with the customers' money, and there should never be any question about the integrity of the system in handling those funds. There are a number of legal requirements governing water system records. For example, public entities in the state of Tennessee are required to deposit monies into their financial institution within three days of having received it. Every public water system is required to have an independent audit completed at the close of each fiscal year. The auditor will then submit the report to the state comptroller's office for review. The water staff should work closely with the auditors, who can assist them in understanding all the requirements. Certainly there are some basic things that every system should do:

1. Any time money is received, a receipt should be given with a copy maintained by the water staff.
2. Monies should be deposited at the system's bank daily with copies of all deposit receipts kept on file.
3. All billing stubs, collection receipts and bank deposits should match so that a trail of all cash transactions is maintained.
4. Billing records should be kept in order to have a customer history and reference for settling any disputes. MTAS can provide a record retention schedule detailing how long to maintain the records of the water system.
5. Invoices should be dated the day they are received and processed in a timely manner. All invoices should be approved for payment by someone other than the person writing the checks for payment.
6. Check registers should be kept for all checks written detailing the date, to whom the check is written and the amount. Checking accounts should be balanced to the bank balance on a regular (monthly) basis. Any discrepancies should be noted and corrected. Canceled checks should be maintained according to the retention schedule. Voided checks should be clearly marked as void and maintained per schedule. It is advisable that the water system have a written policy requiring multiple signatures on all checks of larger amounts. (The amount can vary. Check with the auditor.) At no time should employees be permitted to write checks made out to cash, and blank checks should never be submitted or authorized for signature.
7. Payroll records should contain employee information, hours worked, rate of pay, check amount and withholdings. Any time an employee receives pay it must be by check or equivalent, such as direct deposit.
8. Tax records, whether payroll or sales tax, should be maintained per the tax agency schedule.
9. Monthly and annual financial reports and annual audits should be maintained per schedule. Public water system records are open public records and may be inspected at any time by anyone who is a resident of the state of Tennessee. Poor record keeping may result in lost revenues or added expense. Also, the public may believe that their money is not being handled properly if an audit reveals poorly kept records.
10. All purchases should include a purchase order with approval for the purchase. Larger items (those over a set dollar amount) must be bid and documented as to the purchase. Water staff should check with the auditor as to specific state law requirements. Public water systems are subject to state purchasing law requirements;

you can obtain a copy of the purchasing laws from the state.

Financial Reports: Public water systems are required to present financial reports that conform to the standards set by the Governmental Accounting Standards Board, known as GASB. In recent years GASB has made significant changes to the financial reports that were previously issued.

Water system managers need to be familiar with three basic types of financial reports:

1. ***Statement of Revenues, Expenses, and Changes in Fixed Net Assets*** (formerly called the income statement). This statement should be issued monthly and list the revenues and expenses of the operation. There are two main sections to the statement, the first being the difference between operating revenues and expenses, including depreciation. This is called the operating income or loss. Below this line in the report will be the non-operating revenue and expense that includes interest earnings, interest expense and contributed capital such as grants. By state law, water systems are required to make a profit. Realistically, there must be a profit generated in order to fund the operational, maintenance and capital projects required. Comparisons of revenues and expenses should be made to previous reports. Unusual differences, such as a large increase in an expense item, should be investigated.

2. ***Statement of Net Assets*** (formerly called the balance sheet). The water system will have a statement of net assets showing the assets and liabilities. The asset section consists of items that provide value to the utility, such as plant and equipment, cash, inventories, and accounts receivable. Liabilities include accounts payable, bonds and notes payable, and customer deposits. The difference between assets and liabilities are the net assets of the system.

3. ***Statement of Cash Flow and Proprietary Funds*** (formerly called the cash flow report). The statement of cash flow will break down cash being generated by the water operation against outgoing cash needs. This report should be compiled each month and will help gauge the cash needs of the system.

Water board members and management staff should work closely with the accounting staff and the auditor to develop a thorough understanding of the financial reports.

Today computer equipment and software are relatively inexpensive and easy to operate. The water system should invest in both computers and trained personnel to handle all of its records. Software will generate and maintain the records that are needed, and management will benefit by having much more information available to them to aid the decision-making process.

Revenues and Rate Setting

The life of the water system is contained in the revenue stream that keeps it operating. The bulk of revenues will come from customer billings for water sold or sewage treated. Proper rates must be established and maintained. Generally, 80 to 90 percent of the revenues of any water system come from customer billings. There are several important points to consider. One is the meter, which basically serves as the cash register for the water system. All customers should be metered. Meters should be read on a regular basis and any problems noted. The water system should have a meter change-out program to replace aging meters (recommended every 1 million gallons used or eight to 10 years). Larger meters, such as those that serve industry, should be checked and calibrated annually. Policies should be in place as to how to meter and bill multiple-use customers, such as apartment complexes and trailer parks. The water system should also have policies about estimated readings and adjustments for leaks, filling pools, etc.

There are two basic types of rate structures for water systems. The most common type of rate is the declining block rate. This rate structure will have a minimum bill, usually covering 1,000 to 2,000 gallons of usage, and rate steps per thousand gallons that become cheaper with larger volumes of usage.

Example of a declining block rate structure:

Usage	Rate/thousand gallons
First 2,000 gallons (minimum bill)	$10
Next 8,000 gallons	$2/thousand
Next 10,000 gallons	$1.80/thousand
Excess over 20,000 gallons	$1.60/thousand

The declining block rate structure often is used to encourage economic development. Large users, such as manufacturers, would receive a cheaper rate for the bulk of their consumption. The other type of rate structure is the increasing block rate. It also uses a minimum bill and block steps that increase with greater consumption. Obviously, this structure discourages water usage and is used primarily to promote conservation. As water supply issues become more intense in Tennessee, the use of increasing block rates will probably increase.

Example of an increasing block rate structure:

Usage	Rate/thousand gallons
First 2,000 gallons (minimum bill)	$10
Next 8,000 gallons	$2/thousand
Next 10,000 gallons	$2.20/thousand
Excess over 20,000 gallons	$2.40/thousand

There are some basic considerations about rates, regardless of the type of structure the water system chooses. In order to set rates properly, the system needs to calculate the actual cost of water produced. Take the expenses of the water system, including debt and depreciation, and divide the cost by the gallons of water treated for sale. At the very least, the rates should cover the cost plus some percentage for profit, as the system will need to have funds for capital improvements. In theory, the minimum bill should be enough to pay for the fixed costs of the water system. Fixed expenses are those the system will incur whether it sells any water or not. You will have to pay employee base salaries, insurance on the property and equipment, and debt payments, no matter how much water you sell. The minimum bill is like a guarantee from every customer that those monies will be received. The rate per thousand is then used to pay for variable costs that change depending on how much water is treated and sold. Variable costs include chemicals, electricity for pumps, overtime, and repair parts. Many municipal water systems have separate rates for inside- and outside-city customers.

Outside-city rates will typically be from 150 percent to 175 percent higher than rates for inside customers. Some water systems have different

rates for residential and commercial customers. User rates need to be sufficient to pay all expenses, plus provide monies for debt payments, new equipment, line extensions, etc. Rates should be reviewed annually. Management should consider enacting a small, cost-of-living increase each year to keep revenues in line with expenses that rise due to inflation. Typically, water systems wait several years until they have to enact an increase that is then much larger. Many times that percentage increase translates back to the cost of living over the same period of time. Customers usually get less upset over a series of gradual, smaller increases than over a large one.

Fees for Services Provided to Customers

Public water systems should establish a policy of fees for certain services provided to customers. Fees help offset the need for more rate dollars and are charged only to customers who are using the water system's services beyond normal water sales.

Service Charges: The water utility must do several things when a new customer desires service. An application must be taken and a service order completed so that the meter can be installed or turned on. Then, employees must go to the location, turn on the meter and collect an installed meter reading. The office staff must then put the customer's information into the billing system as an active account. All these functions involve the time of water system employees and the use of equipment. As a way to recover at least a portion of that cost, the utility will charge a service fee. Typically this fee is $25 to $50 and is a one-time, nonrefundable fee. This fee can sometimes add quite a bit of additional revenue to systems that are experiencing growth.

Collection Fees: Collecting past due water and sewer accounts also will cost the city money in personnel time and record keeping. Sometimes water services may have to be discontinued for nonpayment. Billing collection procedures should be put in place so that personnel know how to handle nonpayment situations and to ensure that all customers are treated fairly. Customers who cost the city in the area of collections should be assessed a fee to recover those costs. Collection procedures should specify the costs to be recovered and the charge for each. This also will help encourage customers to make timely payments of their bills.

Reconnection Fees: Occasionally the water system has to disconnect a water service due to the nonpayment of a bill. The customer then usually pays the bill and has the service turned back on. Again, this involves the system's equipment and the time of employees who have to go to the location and office staff who have to handle the paperwork. The water system should charge a reconnection fee to assist in recovering a part of that cost. This fee typically is very similar to the service charge and ranges from $25 to $50.

Damage Fees: Customers, contractors, and others will sometimes damage meters, dig up water lines, etc. The water utility normally will make repairs and should then make every effort to recover these costs from whoever did the damage. The water system should belong to the Tennessee One-Call System, which will provide notification of where digging on its lines is taking place. Also, under recent legislative changes, the utility must belong to One-Call in order to ensure being able to recover costs. Customers should be notified to contact the water utility if they need a meter turned off to make repairs, etc.

Tap Fees: When a customer requests a completely new service the water system must tap into the water or sewer line and set a meter box and meter. The cost of this new tap should be borne by the customer receiving the service. Materials, labor, and equipment should be calculated in the cost. This fee would be paid at the time service is

requested. Typical fees range from $500 to $1,000. (In Tennessee the average tap fee is approximately $600.) The costs of installing the tap should be reviewed annually, or at least every two years, and adjusted accordingly.

Expansion Fees (Impact Fees, etc.): Every water utility should have a written policy as to line extension requests, subdivision development, and other requested expansions of the system. Many utilities require fees to help offset the cost of the new lines. The policy will specify the regular tap fee, as well as a cost share for running the new line to the customer. For example, a developer wants to put water into a new subdivision that is located 2,500 feet from the end of the existing water line. The utility will require the developer to pay for the cost of this extension. If new customers are coming on this line the utility may require them to pay a fee to hook on to the water system. Then there may be a sharing of this fee with the developer so that he is able to recover at least a part of the cost of the line. The purpose of these fees is to ask the new customer to "buy into" the system, which everyone else has been helping pay for through their rates. Fees generally are based on the cost of the extension.

Fire Hydrant Charges: Municipalities may elect to establish a charge from the water fund to the city general fund for fire hydrants. Usually the water system buys and installs fire hydrants. They are then "rented" by the city for use of the fire department. Water systems do not need fire hydrants to operate and many times incur additional distribution costs in order to install and maintain fire protection. Since this is for the benefit of the city, the general fund helps pay for this service.

Industrial Pretreatment Charges: Users who discharge industrial process wastewater may be subject to additional regulatory requirements and charges for high-strength discharges. If the city issues industrial user permits the user should be required to cover the cost of generating and administering the pretreatment system. Additionally any user who discharges high-strength wastewater should pay higher fees in the form of surcharges to offset the cost of treating that high-strength wastewater.

Many utilities find it necessary to regulate food service establishments because of the discharge of fat, oil and grease. Permitting, inspection and surcharge fees may be added to the user's regular sewer bill to offset the costs of this additional work.

Grants and Loans

At times, water systems will need additional monies to upgrade, expand or improve the system. These improvements may be funded from cash reserves, but cities often need grants and loans to provide these additional funds. Grants are much harder to acquire now than just a few years ago, and the competition among water systems is much greater. Grants often go to systems based on a need or on a priority basis. There are several different types of grants available. Some, such as Community Development Block Grants (CDBG), are stand-alone grants, while others, such as those through Rural Development (formerly the Federal Housing Authority) may be tied to loans. Agencies such as the Community Development Districts provide assistance to water systems in making grant applications. Also, system engineers will help with grant applications and often are the ones who provide the necessary documentation to demonstrate need.

There is a wide variety of loans for water and sewer systems, all with varying requirements. Like grants, some loans are tied to need. Most loans may be applied for at any time. Interest rates and terms vary. All loans require the water system to show the rates and revenues that ensure repayment of the loan.

To aid water systems in locating and applying for loans and grants, MTAS has issued a publication entitled *Finding Money*. *Finding Money* provides information on an array of grant and loan agencies, including addresses and phone numbers, who may apply and when, etc.

Proper planning and budgeting are important parts of the grant and loan process. Having time to "shop around" for the best deals in grants and low interest rates saves money and holds down rates.

Regulatory Requirements

There are several sections of the *Tennessee Code Annotated* that set forth the requirements for financial operation of a public water system.

T.C.A. § 7-34-115 requires municipal utility systems to operate as self-sufficient entities, setting rates that are a reflection of the actual costs of providing the service.

T.C.A. § 7-35-414 sets out the requirements for municipal water systems to use funds obtained from rates and charges to pay operational and maintenance costs, retire debt principal and interest, and fund depreciation.

T.C.A. §§ 7-82-304 and 7-82-403 empower water utility districts to incur debt, borrow money, and set and revise rates.

T.C.A. § 7-82-401 requires water utility districts to maintain books and records that conform to generally accepted accounting principles and to have an annual independent audit of the records that is submitted to the Tennessee comptroller's office for review.

There are a number of sections in Title 7 of the code that set out the powers of water systems and districts to borrow money, issue bonds, pay off debt, etc.

T.C.A. §§ 7-82-701–703 create the Utility Management Review Board, which has oversight over financially distressed utility districts. A water system is financially distressed when it has three consecutive years of net income losses, negative net assets, or defaults on any debt.

T.C.A. §§ 68-221-1007–1010 create the Water and Wastewater Financing Board, which has oversight over financially distressed public water systems. The board originally was established to oversee wastewater systems. Water was included if it was a combined fund. In 1997, the law was amended to give the board oversight over water systems as well. As in the case of utility districts, a public water system is distressed if it has two consecutive years of net income losses, negative net assets, or defaults on any debt.

Water systems that fall under the authority of either the Utility Management Review Board (UMRB) or the Water and Wastewater Financing Board (WWFB) must submit a plan to remedy the financial distress. This plan can include rate increases (or a series of increases), new revenues because of growth, change in or charging of fees and cost-saving measures. The water system will remain under the authority of the appropriate board until a net income is produced or the net assets are eliminated. Once an audit is produced showing that the deficits have been eliminated, the water system will be reported as being in compliance with state law and released from board authority.

Summary

The financial operation of a water system functions, in many ways, just as the operational and maintenance portions. To neglect the financial side is to invite disaster, just as neglecting maintenance will lead to much bigger operational problems.

There are several important considerations for water system management:

- Proper revenues must be maintained through rates, fees and other revenue creating measures.
- Accurate records must be kept. Records should be updated on a timely basis and always available for review.
- Planning through budgeting allows water systems to know their revenue needs. Proper planning also allows for obtaining grants and provides time to "shop around" for the best loans. All this adds up to savings to the customers and lower rates.
- Water system staff should be aware of state and audit record keeping requirements. This will prevent compliance problems.
- Controls should be in place to ensure the integrity of the system's finances. These controls should be in the form of policies and procedures that all water personnel will use.

PURCHASING AND CONTRACTING

Every water system organization needs to develop purchasing and contracting policies and rules to ensure that public or member funds are used efficiently and ethically. Municipalities are allowed to develop their own purchasing policies, but these policies are subject to Tennessee rules governing municipal purchases. These guidelines help prevent overspending and help reduce the risk of legal action due to questionable or uncertain business practices.

Purchasing and contracting policies include specifications for purchasing equipment, materials and services. They provide guidelines for purchasing at the lowest cost provided that the goods or services are of comparable quality and can be delivered in a timely fashion. They also specify how goods are to be delivered to ensure that goods or services go to the proper location and transactions are completed. Purchasing and contracting policies help protect board members from taking business actions that make them vulnerable to lawsuits. Following the policies helps ensure that the board is operating in the best interests of its consumers.

A board should closely examine purchasing and contracting policies using municipal policies as guidelines. Policies probably will need to be adapted to fit the needs of the particular organization. Nonprofit corporations are encouraged to examine and possibly amend their bylaws to establish purchasing policies.

Purchasing Policy Guidelines

The MTAS publication *Purchasing Guide for Tennessee Municipalities* can assist the board in making purchasing decisions.

Notices: Notices shall describe the contract to be made or equipment to be purchased or refer to the specifications on file that have to be filled before bids are let. Notices shall include the times during which bids are to be received and the place where bids are received. If no local newspaper is published in the locality or the county, notices shall be posted at the courthouse or city hall and two other public places, and notices shall be posted for two consecutive weeks in a newspaper having circulation in the area.

Vendor File/Bid File: Agencies also shall maintain a vendor file for bid solicitation and a bid file that lists vendors to whom bid information is mailed. Specifications pertinent to such bids shall not be written to exclude comparable equipment domestically manufactured. A registered engineer or architect may write specifications requiring specific equipment available from limited sources if the purchase can be justified under the existing rules and regulations of the appropriate authority.

Purchase and Contract Bids: Purchases and contracts may be made from the lowest and best bidder, including freight and shipping charges. If a bid other than the lowest bid is accepted, a written narrative, along with the necessary calculations and dollar amounts of each bid, is required explaining why the accepted bid was determined to be the lowest and best bid. Bids cannot be based on items not included in the specifications.

If only one bid is received, the bid may be accepted if the bid is opened and the bid is within the funds allocated for the project.

If the lowest and best bid is no more than 10 percent above the funds allocated for a construction or renovation project, the board or agent is permitted to negotiate with the lowest bidder to enter a contract not to exceed the funds allocated.

For timely completion of projects or for ready availability, no more than two alternate bids may be accepted. An alternate bid cannot be used unless the lowest and best bidder cannot deliver the commodities or contract contained in the bid for reasons beyond the bidder's control. If the low bidder accepted cannot deliver, one alternate bid can be accepted.

Contract Modifications: After a construction contract is made and it is determined that contract modifications are necessary or would better serve the purpose, the organization may order the changes without further public bids if the changes are made in a commercially reasonable manner and do not circumvent purchase rules. The engineer or architect hired by the purchaser shall have authority to authorize changes when the change requires expenditures that are less than 1 percent of the contract amount.

Emergency Situations: If an emergency situation is determined to exist and the delay caused by the competitive bidding process would be detrimental to the interests of the municipality or the utility users, the rules of competitive bidding will not apply, and the board or the board's agent can make the purchase or purchases. Only purchases directly related to the needs of the emergency may be made. The purchaser is responsible for explaining the emergency to the board at the next regular board meeting and documenting the purchases with a description of the item or service along with the appropriate prices and costs.

Equipment Repairs: Equipment repairs made by a private-sector business are exempted from bid requirements unless the repair is for a complete unit such as an engine, a transmission, a rear axle, or other units where the total component replacement is known before disassembly. If repairs are made, the specific repairs, the specific repair part identified by number and name, the supplies used, and the hours of labor and labor costs are required before payment is made.

Vehicle or Equipment at Auction: For municipalities, any motor vehicles or equipment purchased from a federal or state agency at a public auction held for disposing of vehicles or equipment shall require advance authorization including the item or items to be purchased and the maximum bid payments allowed.

Lease-Purchases and Lease-Purchase Financing: Rules for lease-purchases and lease-purchase financing should be included in the purchasing policies. Rules regarding lease-purchase bids, financing, interest rates, and terms of payment are regulated for governmental bodies. Lease-purchases are allowed. Generally, lease-purchase financing is allowed after two competitive written bids have been solicited, and this may occur before or after accepting purchase bids. Interest rates

cannot exceed maximum interest rate to maturity on general obligation indebtedness. Terms cannot exceed the useful life of the property as determined by the upper limit of class asset depreciation ranges (ADR) established by the IRS.

Steps of a Request for Proposal

1. Prepare bid request. This should contain specific information about the item or job. Obtain technical expertise for assistance on technical items.
2. Establish date and time for bid opening.
3. Select possible sources.
4. Prepare specifications with technical assistance.
5. Mail bid requests and advertise as appropriate. It may be advisable in some circumstances to have a pre-bid meeting with all potential suppliers before they submit their bids.
6. Receive and open bids.
7. Evaluate bids (with technical assistance if needed).
8. Award bid.
9. Maintain all specifications and bid data files.

If you would like assistance in preparing a request for proposal, please contact your MTAS consultant.

Purchasing Rules and Ethics

Conflict of interest and nepotism rules may prohibit purchasing from certain individuals or companies. Directors and board members of municipalities and water associations are subject to laws regarding conflict-of-interest transactions. In small communities, problems often arise because the only local purchase option available may involve nepotism or a conflict of interest. Take every precaution when purchasing from or when hiring family members of directors. Make sure these decisions are made with the advice of the board attorney.

Checklist for Purchasing and Contracting Policies

The following checklist will help board members prepare to make purchases and contract for services.

- There is a board attorney who is capable of verifying our purchasing and contracting policies.
- A system for purchasing goods and services has been developed with the advice of the board attorney to ensure that the system developed follows all the legal directions and mandates of the municipal codes and any other laws that apply to purchasing and contracting.
- Purchase forms, contract forms, and all other acquisition forms to be used by the organization for making purchases and contracts have been obtained. Space has been provided on the forms for:
  - Product or service requested;
  - Quantity needed;
  - Written justification; and
  - Proper signatures.
- A board member has been assigned responsibility for purchases and contracts and for making sure that the rules of the purchase system are followed.
- A purchasing agent has been designated for the organization.
- Approval procedures and authorizations have been established for small purchases and for large purchases, including:
  - Reimbursement policy and a description of small purchases that require receipts;
  - A description of purchases that require purchase forms;
  - A description of purchases and contracts requiring board approval; and
  - Proper authorizations.
- The specifications for this item or contract, if required, were developed by a certified engineer or architect.

- The purchase system developed by the board in consultation with the board attorney was followed. Municipal purchase systems and associations adopting the municipal codes have to follow specific rules regarding the size of the purchase or contract.
- The rules regarding the amount of purchase or contract are known, and the amount is
  - $1,500 or less;
  - from $1,500 to $10,000; or
  - more than $10,000, and for bid openings, more than $15,000.
- Bids are solicited for projects of $150,000 or more if the contract cannot be started within a 24-month period.
- The required notices for bids have been posted or published in the local paper for the required number of days.
- The published notice contained the proper information regarding the exact nature of the purchase or project and referenced the specifications of the job or product.
- The date for opening bids was properly established and met the requirement for the specified number of days between the last published notice and the bid opening.
- The required number of bids for the amount of the contract or purchase has been met.
- The bids received were all submitted on a proper bid sheet with the proper signatures.
- If the lowest bid was not accepted, a narrative in writing explains why the bid that was accepted was chosen. The proper dollar figures are attached, and this information is presented to the board and included in the board minutes.
- Only one bid was received, and it was accepted because it fell within the boundaries of the funds allocated to the project.
- If the best bidder is not able to fulfill a contract, we accept one alternate bid from the only two alternate bids that we allow to be submitted.
- If the lowest bid was within 10 percent of the funds allocated for the purchase or project, negotiation with the low bidder resulted in the bidder's agreement to accept the allocated funds.
- If, after a bid is accepted, the engineer determines that some contract modifications would better serve the purpose, these changes are made without public bids if the changes will cost less than 1 percent of the contract amount.
- No bids are accepted that include items not found in the specifications.
- In an emergency situation, the normally required bidding process may be suspended if doing so is in the best interest of the public or water users. The emergency is documented only when products or services necessary to meet the emergency are purchased.
- Repairs to wells and equipment are made without soliciting bids, but complete equipment units or total components are not replaced without following bid rules. Repairs are clearly documented with respect to specifying items or parts, labor hours and costs, and total costs of the project.
- There are established guidelines regarding repeated purchases from a vendor. All purchases made within a single month are under a single purchase order, but a new purchase order must be issued each month.
- Where conflict of interest or nepotism questions arise, the board's attorney is consulted before making any decisions.

Chapter 3: Technical and Regulatory Issues

Utility Security

Both drinking water and wastewater utility services are highly dependent on a large number of capital assets. Leaders and managers must be concerned about procuring assets, managing assets, maintaining assets and now, after the events of September 11, 2001, they have an additional responsibility to secure assets. Terrorists have expressed the desire to attack United States infrastructure. Drinking water systems have been attacked in past wars, and past wastewater system catastrophes highlight the vulnerability and importance of our water and wastewater systems. These are critical public service assets, many of which are located in public areas that cannot be secured using standard measures. Loss of drinking water or wastewater systems can place public health at risk, stop all economic activity in your community, and damage the environment to such an extent that the public health risk becomes more widespread.

Drinking water systems are required by federal law to conduct vulnerability assessments; expect wastewater systems to have this requirement in the future. These assessments, if conducted honestly, should help the utility reduce its vulnerability to a variety of threats, from terrorist acts to natural disasters. The ability of a utility to meet its mission of reliable, liability-free service in spite of an attack or natural disaster is a significant accomplishment for its leaders, managers and staff. But to achieve this level of resilience requires commitment and investment.

As leaders of the utility, board members set the security policy. Through direct action or inaction, managers and employees will follow your lead. If you ignore the issue or take it lightly they will also. On the other hand, if you acknowledge the importance of honestly and thoughtfully conducting vulnerability assessments and provide the resources to make the changes that the assessments recommend, your system can reduce the risks associated with identified threats.

Most municipal utilities are not at high risk of attack from international terrorists, but most are at risk of several types of severe weather, vandalism, and actions from angry or disgruntled customers and employees. Everyone in today's world is at risk of attack from computer worms, viruses and other cyber threats.

There are several tools available that can be used to conduct vulnerability assessments. A good starting point on the wastewater side is the Association of Municipal Sewer Agency's Vulnerability Checklist. This easy-to-follow checklist can be supplemented with its Vulnerability Self Assessment Tool. This compact disk contains worksheets and blank report forms as well as links to various Internet resources. The National Environmental Training Center has a *Guide for Small Wastewater Systems*, which also is a good resource for a system's first vulnerability assessment. On the drinking water side the American Water Works Association has a program on compact disk called RAMW. All of these tools follow a general pattern of identifying assets, threats, and vulnerabilities, then locating ways to protect vulnerable assets from the highest threat or finding ways to reduce vulnerability through hardening of the asset and, finally, identifying ways to recover if an asset is damaged. The last item involves making plans to respond to an emergency. These emergency response plans may be the most important part of the assessment process and may not involve a significant cost other than the time involved in their preparation and practice.

The culture of an organization is the most important element relating to security. The values and attitudes of the governing body, management and employees have a direct and significant influence on how the organization responds to the challenge of the day. Whether the challenge is related to compliance, maintenance, finance or security, if the mission is to provide high quality utility service the response will be consistent and predictable. Today's challenge is the vulnerability of utility assets. Completing a vulnerability assessment or planning for disasters and attacks is difficult and time-consuming work, but it also can be an exceptional learning experience. Vulnerability assessments can help focus the organization on possible weak links in infrastructure, personnel, or procedures. Strengthening these weak links will improve system capacity to withstand a threat whether it is natural or manmade. Vulnerability assessments are simply another way of looking for potential areas of risk, identifying ways to reduce that risk, then making preparations to respond after the fact.

Safe Drinking Water Act (SDWA)

The U.S. Public Health Department created the first federal regulation for drinking water quality in 1914. The health service established bacteriological standards for drinking water for systems that provided water to interstate carriers, including ships, trains and buses. The health service revised the standards list in 1925, 1946 and 1962. After the 1962 revisions, the standards regulated 28 contaminants.

With some changes, all 50 states adopted the Health Service standards as guidelines or regulations for public water systems even though there was no federal mandate for the states to do so.

In 1973, legislative proposals for a Federal Safe Drinking Water Law were introduced. The result was the Safe Drinking Water Act (SDWA) of 1974. The law is administered by the U.S. Environmental Protection Agency (EPA) Office of Ground Water and Drinking Water. The original law was amended in 1986 and 1996.

The purpose of the SDWA is to provide protection for consumers of water from harmful contaminants. It applies to all public water systems; private wells are not covered by this act. EPA designates categories for public water systems based upon where the system serves the consumer and how often it serves the same consumer. Municipal water systems are classified as community water systems (CWS) because they provide water to the same persons year round. CWS are subject to all federal regulations. In the United States there are around 54,000 CWS serving more than 250 million homes.

The 1974 SDWA had EPA take a two-step approach to the regulation of drinking water. The first step used the Public Health Service standards as a basis to form interim primary regulations that included maximum contaminant levels (MCL), monitoring requirements, reporting, record keeping, and public notification. The second step allowed for a comprehensive review by the National Academy of Science, which would then allow the EPA to revise the standards as needed.

Eighteen interim standards were set in 1975: six synthetic chemicals, 10 inorganic chemicals, turbidity and total coliform bacteria. In 1976, interim standards were set for radionuclides and radium-226 and radium-228. Standards for total trihalomethanes were set in 1979 along with a nonenforceable set of guidelines. These guidelines were secondary standards because they affect the aesthetic quality of water.

In 1986 the SDWA was reauthorized with additional amendments. The changes included setting MCLs and MCLGs (maximum contaminant level goals) for 83 named contaminants. The original 18 interim standards were reclassified as final primary water standards.

The 1986 SDWA reauthorization also:

- Established regulations beyond the 83 specified contaminants within certain time frames;
- Regulated 25 additional contaminants every three years by 1991;
- Required disinfection of all public water systems;
- Specified filtration requirements for surface water systems;
- Developed groundwater protection programs such as wellhead protection;
- Established state monitoring requirements for unregulated contaminants. These reports, which are due every five years, will allow EPA to decide whether the contaminants need regulation;
- Banned lead-based solder, pipe and flux material in water distribution systems; and
- Specified the "best available technology" for treating each contaminant with an MCL.

In 1988 the SDWA was amended to include the Lead Contamination Control Act, which eliminated lead-containing drinking water coolers in schools.

The 1996 SDWA amendments were designed to provide comprehensive public health protection. The vehicles to provide this protection are setting risk-based standards, increasing funding, relying upon best available science, using prevention tools, and instituting programs that strengthen EPA and participating partners in drinking water issues.

Some of the amendments included:

- Consumer confidence reports, which were first published October 1999;
- Source water assessments;
- State capacity development strategies;
- Operator certification revisions;
- Public notification improvements;
- State annual compliance reports;
- Disinfectant-Disinfection By-Products Rule;
- Interim Enhanced Surface Water Treatment Rule;
- Ground Water Rule; and the
- Backwash Water Rule.

Federal Process for Setting Regulations

EPA must go through several steps to implement any new regulations regarding water:

1. EPA first determines what contaminants to regulate.
2. EPA develops a "proposed rule" with the help of a group of stakeholders.
3. The proposed rule is published in the Federal Register.
4. EPA specifies a comment period for the proposed rule. EPA may hold public meetings at this stage. Congress has mandated that the public have a role in the rule making process; EPA must respond to the comments in the publication of the final rule;
5. Once EPA has addressed all the comments and revised the rule, the final rule is published in the Federal Register.
6. Normally there is a two- to three-year period between publication and the final implementation date. This is the period when the states with primacy develop their specific state regulations. State regulations must be the same as the federal regulations or more stringent. State regulations are approved by EPA and then implemented at the state level.

Tennessee's Mutual Aid and Emergency and Disaster Agreement Act of 2004

This act applies to utilities, as well as public safety and Emergency Medical Services (EMS). As of June 30, 2004, all mutual aid agreements in Tennessee, except those extended by resolution of the governing body between May 14 and June 30, 2004, have been abolished and replaced by the statute. The statute contains a standardized mutual aid agreement, and this agreement is in effect between all government entities listed in

the act. The Hot Topic covering this statute can be viewed at MTAS's Web site: www.mtas.tennessee.edu. The article is titled "Emergency Assistance and Mutual Aid in Tennessee: 2004 Update."

Tennessee's Rules and Regulations

The state of Tennessee has been granted primacy in the area of enforcement of drinking water regulations. T.C.A. §§ 68-221-710–720 are entitled Tennessee Safe Drinking Water Act of 1983. The federal regulations are incorporated into the rules and regulations of the Tennessee Department of Environment and Conservation (TDEC) through the authority listed in this section of T.C.A.

The Tennessee Safe Drinking Water Act discusses the role of the Water Quality Board, which was formed under the Water Quality Control Act, T.C.A. § 69-3-104. According to this act, the Water Quality Board "has and shall exercise the power, duty and responsibility to establish and adopt standards of quality for all waters of the state."

Tennessee has had regulations involving water for a number of years. Listed below are the regulations and the years in which they were enacted.

- Water Resources Division Act of 1957.
- Water Withdrawal Registration Act of 1963.
- The Public Water and Wastewater Environmental Health Act of 1971.
- The Tennessee Water Quality Control Act of 1977 with 1994 amendments.
- The Water Environment Health Act of 1984.

The Tennessee Department of Environment and Conservation, Bureau of Environment, Division of Water Supply, has a set of rules and regulations for water systems. The Division of Water Supply is responsible for supervising public water systems. These rules and regulations are the culmination of federal regulations and Tennessee adapting laws to meet the federal guidelines.

These rules and regulations are issued under the authority of Public Acts of 1983, Chapter 324. The rules are chapter 1200-5-1, "Public Water Systems." As new EPA regulations are added through the SDWA amendments, the Division of Water Supply updates the rules to meet federal guidelines.

Sources:

1. EPA 816-R-99-007, "25 Years of the Safe Drinking Water Act: History and Trends." December 1999. United States Environmental Protection Agency.
2. "Community Water Bulletin," Number 179; Published by the Community Resource Group.

Capacity Development Rule

The Capacity Development Rule is a two-part program that deals with water system capacity. Capacity is defined as the capability to function as a water system in accordance with accepted performance criteria. The emphasis of this rule is on capacity development of the system, not enforcement of regulations regarding standards. Adequate technical, managerial, and financial capabilities will be necessary to comply with applicable drinking water standards.

Technical capacity is the physical infrastructure of the water system and the ability of system staff to implement required technical skills and knowledge.

Managerial capacity addresses the management structure of the water system, which includes accountability, staffing, organization, ownership and communication.

Financial capacity refers to the financial resources of the water system, which include revenue sufficiency, credit worthiness and fiscal controls.

The first part of the regulation requires that the state ensure that all new community water systems (CWS) and non-transient non-community water systems (NTNCWS) beginning operation after October 1, 1999, demonstrate technical,

managerial, and financial capacity. If such capacity is demonstrated, the system is a viable water system and is able to comply consistently with the Tennessee Safe Drinking Water Act and the regulations found in 1200-5-1.

The second part requires that the state develop and implement a statewide strategy to help increase the technical, managerial, and financial capacity of existing water systems that are chronic violators or have the potential to become chronic violators.

Sources:

1. "Capacity Development Rules," Division of Water Supply; Chapter 1200-5-1.
2. *Community Water Bulletin*, Number 152.
3. *Community Water Bulletin*, Number 154.
4. Draft Capacity Development Provisions of the Safe Drinking Water Act of 1996, Tennessee Department of Environment and Conservation; Division of Water Supply. "Capacity Development Strategy" August 1999, Application to EPA.

Rules of Tennessee Department of Environment and Conservation Bureau of Environment, Division of Water Supply

The following section is a primer for Chapter 1200-5-1 (Public Water Systems). The intent of this section is to provide basic definitions and information about the rules of operating a water system.

This rule applies to all public water systems that provide piped water for human consumption if such a system has a least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of a year. There are different types of systems under this rule.

Types of Systems

1. Community water system: A public water system that serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.
2. Non-community system: A public water system that is not a community water system and that generally serves a transient population such as hotels, motels, restaurants, camps, service stations, churches and industries.
3. Non-transient non-community water system: A non-community water system that regularly serves at least 25 persons over six months out of a year.

Types of Supply Sources

1. Surface water supply from a river, stream, lake or impoundment.
2. Groundwater supply.
3. Groundwater under the direct influence of surface water is any water beneath the surface of the ground with (1) significant occurrence of insects or other macroorganisms, algae, or large diameter pathogens or (2) significant and relatively rapid shifts in water characteristics, such as turbidity, temperature, conductivity, or pH, which closely correlate to climatological or surface water conditions. This group is determined by TDEC criteria and is site specific.

The type of supply source drastically affects treatment and monitoring requirements.

Certified Operator Requirements. All operators in direct responsible charge of a water system, including the treatment plant and distribution system, must be certified by TDEC as competent to operate the systems per T.C.A. § 68-13-904 (1200-5-1-.17-10). All community water systems that are classified as surface supply and as filtration systems and all iron removal plants that use gravity filters must have an operator in attendance and

responsible for the treatment process when the plant is in operation.

An operator must work in a plant for a period of time before the operator certification board will allow him or her to take the test. An operator who has passed the test must attend continuing education at least once every three years to retain the license. There is a yearly renewal fee for each license held by an operator.

The rules governing operator certification are found in TDEC (1200-5-3) and in the Water Environmental Health Act, T.C.A. §§ 68-221-901–915. EPA has a new operator certification rule that will slightly modify Tennessee's operator certification program.

Operation and Maintenance Requirements: Section 1200-5-1-.17 lists operation and maintenance requirements. Items covered under this section include fire protection criteria, fluoride levels, storage requirements, storage tank screens and customer complaint logs.

Maximum Contaminant Levels: Section 1200-5-1-.06 lists maximum levels for inorganic chemicals, organic chemicals, turbidity, microbiological contaminants and radionuclides.

Sampling and Analytical Requirements: TDEC has listed the sampling and testing requirements for each type of contaminant. The frequency for sampling is listed in each section. Sampling requirements vary based upon source of water or population served.

Monitoring and Reporting: Each specific group of contaminant has its own monitoring and reporting requirement.

Drinking Water Standards and Contaminant Groups: The water system must monitor for different types of contaminants in the water supply or finished water. Listed below are definitions of these groups.

1. ***Primary Drinking Water Standard*** is a maximum contaminant level or treatment technique for each specific listed contaminant that may have an adverse effect on the health of a person.
2. ***Secondary Drinking Water Standard*** is the maximum level for contaminants that may have an adverse effect on the taste, odor or appearance of water.
3. ***Organic contaminants*** are those that contain a carbon derived from a living organism. These include volatile organic compounds such as benzene.
4. ***Inorganic contaminants*** are sometimes called inorganic chemicals. It is a diverse group that does not include any hydrocarbons. The list covers chemicals and compounds such as asbestos, nitrate, cyanide, nickel, sodium chloride (table salt) and copper.
5. ***Turbidity*** is a condition of water caused by the presence of suspended matter (mud) resulting in the scattering and adsorption of light. Nephelometric turbidity units (NTU) are used to measure turbidity in water per EPA requirements.
6. ***Microbiological contaminants*** are related to microorganisms. Microorganisms include algae, bacteria, protozoa and viruses.
7. ***Radionuclides*** are radioactive contaminants that include alpha particles, beta particles, radon, photon emitters, and uranium.

Record Keeping: Section 1200-5-1-.20 lists the requirements for maintaining water system records. The length of time a written record is kept varies depending on what type of information it contains. The time periods run from two to 10 years. Any documentation from a regulatory agency should not be discarded even after the end of the required time.

Public Notification and Consumer Confidence Reports: Section 1200-5-1-.19 discusses the various requirements of public notification if a public water system fails to comply with an applicable maximum contaminant level or treatment rule established in 1200-5-1.

In an effort to provide consumer information on a regular basis, EPA mandated that annual consumer confidence reports be made available to all customers and consumers of a water system on July 1 of every year. The report will cover the previous calendar year and will contain the following:

- Sanitary survey scores of the system;
- A list of detected contaminants with level detected and whether or not it exceeds the maximum;
- Information about when and where the utility board holds its meetings;
- Information about the EPA hot line;
- A description of the source of water; and
- Mandatory health language per EPA.

Other information will be listed on the consumer confidence reports as required by each system.

Cross Connections: All community water systems must adopt an ordinance or policy prohibiting cross connections. A *cross connection* is defined as any arrangement of sewer, soil or other drain lines or conduits carrying sewage or other wastes in such a manner that the sewage or waste may find its way into any part of the public water system. TDEC rule 1200-5-.17(6) and T.C.A. § 68-13-711(6) prohibit cross connections.

System Capacity: When a public water system reaches 80 percent of its design capacity based on average daily use, the supplier of water shall immediately obtain the services of a competent engineer to prepare plan documents for expanding the system (1200-5-1-.05-10).

Wellhead Protection: Wellhead protection is listed in section 1200-5-1-.34. TDEC has a guidance document to help systems implement its program. All public water systems that use groundwater as a source are required to develop a wellhead protection plan and have it approved by TDEC's Division of Water Supply.

The wellhead protection plan must:

- Designate two zones of protection for groundwater source;
- Perform a potential contaminant source inventory within those zones; and
- Develop and implement management approaches to protect the water supplies with the help of state and local government agencies.

Sources:

1. TDEC Rules and Regulations section 1200-5.
2. The Drinking Water Dictionary, AWWA, 2000.

Unaccounted-for Water

Unaccounted-for water is a bane of water systems. The physical capacity and financial health of a system can be dramatically affected by high volumes of unaccounted-for water. This chronic problem must be monitored and managed to maintain a low percentage of the total water volume produced. Unaccounted-for water also is a vital part of total water resource management. A system must manage its water resources from source to tap.

The Tennessee Legislature passed a law in 2007 that defines how unaccounted-for water is to be calculated and reported on the annual audit. The example of this calculation from municipal audit is shown in exhibit B of this publication.

The Water & Wastewater Financing Board and the Utility Management Review Board are responsible for monitoring unaccounted-for water and may take steps to force a water system to have

an unaccounted-for water percentage below the state goal.

Unaccounted-for water generally is measured as a percentage of the total amount of water produced. There appears to be an accepted norm of 10 to 12 percent unaccounted-for water in water systems across the nation. Some groups are pushing to reduce this percentage to around 5 percent. An alternative to percentage water loss versus total water production is water loss per mile of distribution line. Unaccounted-for water is commonly seen in the greater-than-50-percent range. A private industry could not operate at that level of inefficiency and neither should a publicly owned utility.

Different elements contribute to the total volume of unaccounted-for water. They include leaks, inaccurate meters, water consumed but not metered, improper meter reading and billing/accounting errors. A water leak survey is only one component of a water audit. AWWA has published manual number 36, *Water Audits and Leak Detection*. This is an essential publication for a utility planning to perform a water audit.

Management: A utility must make some decisions about how to approach the problem of unaccounted-for water. The utility must decide how much work can be performed by staff and how much must be done by an outside firm. An audit is a time-consuming project. The capabilities and workloads of employees and the availability of equipment must be evaluated. An outside leak detection company can be used on a cost-per-mile basis. Contract engineering firms can be used to help evaluate the data and make recommendations to correct the problem.

To manage unaccounted-for water, a utility needs a master plan. The master plan must be reviewed and updated regularly. The plan will include these elements:

- Water audit with annual review;
- Leak detection and repair strategy;
- Meter change-out program; and
- Annual meter testing on production and large-use meters.

Water Audit: The water audit is a comprehensive study of the physical and paper side of the water system. It is more in depth than a quick leak survey. AWWA has listed the following steps in a water audit:

1. Before the audit
   - Establish a worksheet
   - Set a study period
   - Choose an official unit of measure

2. The audit
   - Task 1: Measure the supply
     - o Identify and map sources
     - o Measure the water from each source
     - o Adjust figures for total supply
   - Task 2: Measure authorized metered use
     - o Identify metered use
     - o Measure metered use
     - o Adjust figures for metered use
   - Task 3: Measure authorized unmetered use
     - o Identify unmetered uses
     - o Estimate unmetered use
   - Task 4: Measure water losses
     - o Identify potential water losses
     - o Estimate losses by type
   - Task 5: Analyze audit results
     - o Identify recoverable leakage
     - o Figure the value of recoverable leakage
     - o Figure the cost of recovering leakage

3. Calculate the cost of leak detection

4. After the audit
   - Analyze the value of losses and corrective measures
   - Evaluate potential corrective measures
   - Update the audit
   - Update the master plan

Unmetered Authorized Use: Some groups are authorized to use unmetered water for fire fighting, fire hydrant flushing, street washing and city pools. Groups that are responsible for this authorized unmetered use should inform the utility of the water volume used on a monthly basis.

Leaks discovered in the audit/survey should be fixed as time permits. Prioritize the leaks and fix the most costly ones first.

Water Leak Surveys: A leak in the system is the first item that most individuals think of when unaccounted-for water is mentioned. Leaks can go undetected for long periods of time due to proximity to sewer lines, soil composition or stream crossings.

The utility must decide whether to perform the water leak survey in house or to outsource the project. Leak detection equipment is costly and requires training and experience to obtain valid results consistently. A leak survey of only fire hydrants is fairly quick and can obtain good results. A more extensive survey includes all fire hydrants and as many gate valves as possible. Hiring an outside firm to do your survey would cost from $100 to more than $500 per mile, depending upon the situation.

AWWA has listed the steps in preparing for a leak detection survey. Prior to starting the survey, the utility must review the specifics of the water system, including distribution, composition, sizing, meter types, valve types and locations, blow-off locations, flushing information, etc. Walking your distribution system, especially in remote locations, may uncover problems that are hard to pick up in a leak survey because of the distances involved.

Metering: Meters supply the data that generate revenue for the water system. Inaccurate metering will reduce the revenue available to the utility. All meters age and lose accuracy over time, some more rapidly than others. Water meters also provide billing information for wastewater customers, so if a water meter is wrong the loss is doubled.

A utility's meter program should include the following:

- Annual inspection and certification of production meters and large customer meters. Meters can either be removed and taken to a testing facility or checked in place. It is best to check a meter in place because the testing facility cannot reproduce the exact conditions in which the meter operates.
- A meter replacement program. The meter supplier will have an estimate of how long its meter will work accurately. Generally, a meter will last for eight years or 1 million gallons.
- Production and large-customer meters that meet flow requirements, not pressure. A large meter, properly installed in a pit and within operating tolerances (98 to 102 percent of rated flow), will not record flow below its performance minimum. This allows the customer to receive water that he will not be billed for because it is not recorded.

Billing and Accounting Errors: Some unaccounted-for water is the result of human, not mechanical, error. These errors, which can be caught in the water audit process, include:

- Inaccurate meter reading. Either a misread on the old-style dial meter or a wrong factor is used to calculate the use. (Some meters multiply reading by 10 or 100 or 1000. The meter reader simply may use the wrong factor to calculate the monthly total.)
- Transcription errors when recording data, either on the meter book or on an entry into the billing system.
- Rounding errors in the billing process.
- Other human errors.

Wastewater Laws and Rules

The primary federal law that applies to wastewater disposal is called the Clean Water Act (CWA). National Pollution Discharge Elimination Permits (NPDES) that are issued to all wastewater plants are written to comply with the CWA. This permit is the most important document that wastewater plant operators and managers have. It lists numeric limits and a narrative of the requirements that are placed on treated water before it can be discharged into a receiving stream. There is significant risk associated with failure to comply with the NPDES Permit. Violations may result in a simple Notice of Violation or an Administrative Order with fines, and leave the permit holder at risk of Clean Water Act lawsuits by citizen groups. The CWA gives rule-making authority to the EPA. These rules are found in Title 40 of the Code of Federal Regulations. Some common rules that concern plant operators are 40 C.F.R. 136, Test Methods; 40 C.F.R. 403, Industrial Pretreatment; and 40 C.F.R. 503, Sludge Land Application Rule.

Wastewater Regulatory Changes

EPA: The rule governing land application of sludge (40 C.F.R. 503) was changed in September 1999. Several record keeping items changed, including the wording of the certification statement.

MOM (Management, Operations, Maintenance or Capacity Management, Operations, Maintenance): EPA's Sanitary Sewer Overflow Rule, which is not being implemented nationwide, contains requirements for MOM or CMOM programs. This prescriptive method of managing the sewer collection system is being mandated in Tennessee where sanitary sewer collection systems are chronically overflowing. TDEC has taken this approach because of direction from Region 4 EPA, which is aggressively using MOM programs as a tool, or hammer, for improving the management, operation, and maintenance of sewer collection systems. When the Sanitary Sewer Overflow Rule is enforced nationwide there most likely will be a wider use of programs. The changes are coming perhaps later than sooner so utilities should be thinking and acting in the direction the rule is leading.

TDEC, TMDLs and 303(d) list: The Division of Water Pollution Control has begun to calculate the total maximum daily load (TMDL) on impaired streams. If a plant's receiving stream is listed on the 303(d) list, which means that is does not meet the quality criteria, there could be a limit to the amount of wastewater or storm water that can be allowed to flow into that stream. This condition could negatively impact a city's ability to grow.

Wastewater Rules and Regulations

Tennessee Department of Environment and Conservation, Division of Water Pollution Control, has been delegated authority from EPA to administer the NPDES system. State law that corresponds to this delegation is the Tennessee Water Quality Control Act, T.C.A. §§ 69-3-101–201. Another part of the Tennessee Code that addresses both water and wastewater issues is T.C.A. §§ 68-221-101–1113. There also are Rules and Regulations of the State of Tennessee that were promulgated under the authority of these laws. A general description of

these rules and regulations is provided to guide management personnel to chapters of interest. Most chapters include important definitions to help the user understand the language.

1200-4-1. General: These are the general rules of the Water Quality Control Board, its composition, duties, authority, and procedures. The board classifies the waters of the state, sets quality standards for those waters, and promulgates rules to comply with the Water Quality Control Act. The board also reviews orders issued by the commissioner.

1200-4-2. Regulations for Plans, Submittal and Approval: This chapter describes when a registered engineer is required and the procedures for engineer's reports, plans review, and site approval. Operator training by engineers and TDEC personnel, as well as operator certification, are required.

1200-4-3. General Water Quality Criteria for the Definition and Control of Pollution in the Waters of Tennessee: According to T.C.A. § 60-3-101, the Water Quality Control Board establishes general considerations and criteria for waters with respect to pollution and pollution prevention. The chapter includes criteria for the different classifications of surface water and an antidegradation statement. The surface water classifications are:

- Domestic water supply;
- Industrial water supply;
- Fish and aquatic life;
- Recreation;
- Irrigation;
- Livestock watering and wildlife; and
- Navigation.

The antidegradation statement says essentially that good waters will not get bad, and bad waters will not get worse. Groundwaters are classified as follows:

- Special source;
- General use;
- Limited use;
- Site specific impaired; or
- Unusable.

1200-4-4. Stream Use Classification for Interstate and Intrastate Streams: This chapter lists all Tennessee streams and their use classification. If a stream does not meet the quality criteria for its specific use, it will be listed on the 303(d) list of impaired streams. Listed streams will be prioritized for additional evaluation and pollution reduction.

1200-4-5. Effluent Limitations and Standards: This is a general description of NPDES effluent limits. Listed are the maximum effluent limits that could be expected, but in many cases limits are lower because of stream considerations. Discharges cannot be allowed if they result in violation of the antidegradation statement.

1200-4-6. Underground Injection: Operating an injection well where water is injected underground is prohibited without a permit from the department. A description of details of obtaining this permit is in included in this chapter.

1200-4-7. Natural Resource Development (ARAP): An Aquatic Resource Alteration Permit is required for activities within streams and stream channels, lakes and wetlands. Individual permits are required for:

- Dredging, widening, straightening or bank stabilization;
- Levee construction if excavation or fill of stream channel is involved;

- Channel relocation;
- Water diversions or dams;
- Water withdrawals;
- Flooding, excavating, draining and/or filling a wetland; and
- Bridge construction.

General permits cover activities such as:

- Construction of boat launching ramps;
- Alteration of wet weather conveyances;
- Construction of road crossings of waters;
- Utility line crossings;
- Bank stabilization;
- Sand and gravel dredging;
- Debris removal from streams and rivers;
- Bridge scour repair;
- Application of herbicides in aquatic systems;
- Emergency road repair;
- Stream restoration and habitat enhancement; and
- Alteration of up to one acre of isolated wetlands.

1200-4-8. Rules and Regulations Applied to T.C.A. § 69-1-1: These rules govern activities that would affect navigation, such as stream cleaning; construction of mills, dams and locks; and diverting water.

1200-4-9. Water Well Licensing: These rules govern licensing of well drillers and installers, well construction, and standards for well disinfection.

1200-4-10. NPDES General Permits: Application and effluent standards for general permits available for:

- Storm water discharge associated with industrial activity;
- Storm water associated with construction activities less than five acres;
- Backwash water from drinking water treatment; and
- Discharge of water from hydrostatic testing.

1200-4-11. Environmental Protection Fees: Applies to T.C.A. § 68-203-101 *et seq.* Establishes the fee schedule for various regulated activities including:

- Aquatic Resource Alteration Permits;
- Industrial facilities;
- Mining;
- Sewerage treatment facilities;
- Plans review;
- Collection systems;
- Mining operations; and
- Industrial pretreatment.

1200-5-2. Public Sewerage Systems: This chapter contains a brief rule regarding supervision of construction and operations of public sewerage systems, connections between sewerage systems and potable water systems, and investigations of sewerage systems.

1200-5-3. Rules Governing Water and Wastewater Operator Certification: This chapter includes the operator certification procedure plant classification procedures.

Wastewater System Challenges

Infiltration and Inflow (I/I): Infiltration of groundwater and inflow of storm water runoff is the number one wastewater system problem. The added hydraulic load placed upon the collection system

and treatment plant during wet weather can result in additional treatment costs, collection system overflows, plant overloads, and violations. It also robs the system of capacity. Every gallon of storm water that enters the sewer lines and plant will displace a gallon of water from a paying customer. All I/I cannot be prevented, but there should be an ongoing effort to prevent it and to stop it. Solutions to reducing I/I require:

- Direction and support from management;
- Enforcement of sewer use ordinances; and
- Funding for continuous maintenance.

As much as 60 percent of I/I can come from sources on private property. Most sewer use ordinances directly address these issues. Specific I/I issues addressed by ordinance are the prohibition of connections from roof gutters, sump pumps, surface drains, and other sources of storm water that could enter the sanitary sewer. Most ordinances also specifically state that it is the responsibility of the property owner to maintain the service line that connects the building to the sewer main. Poorly maintained service lines are a major source of I/I. Consistent enforcement of these ordinances can result in tremendous financial savings to the wastewater system and the rate payers.

Operators in many cities have demonstrated that I/I can be reduced economically through hard work and persistence. They have found that when they go looking for collection system problems, they find them. Many times these problem areas can be fixed with resources that are readily available. Even if operators cannot make the needed repairs, they have located the trouble spot, which is the first step toward improvement.

Elected officials or board members should ask that utility personnel begin an ongoing I/I control program and support the work with funding.

Solids Disposal: The most common operations problem in wastewater treatment plants is the lack of solids handling capacity. If operators cannot remove excess microorganisms, commonly called sludge, from the biological treatment system in a timely manner, the quality of clean water produced will decline. The most common result of high solids inventory is solids washout in high flow conditions. The causes of excess solids inventory are:

- Inadequate digester size;
- Poor digester management;
- Limited dewatering capacity;
- Failure to take advantage of dry weather;
- Limited disposal options; and
- Wastewater plant loaded with water treatment solids.

For short-term improvement, efficient management of the present facilities is important. Multiple disposal options make year-round disposal easier. Having more than one choice from among land application, drying beds, land filling, or perhaps a compost method can easily improve the timely disposal of sludge and improve effluent quality.

Additional processing equipment can increase the flexibility of solids disposal. Many plants were built with drying beds. The addition of a tank truck will give them two disposal methods, one for liquid sludge and one for dry. There are companies that will bring a portable sludge press to the plant for occasional sludge dewatering. If a plant is able to meet the land application requirements, there may be local farmers who will use their equipment to haul sludge for their own purposes. Sludge dewatering equipment built into dumpster roll-off boxes is a very economical way to landfill sludge.

The long-term solution to solids handling deficiencies is to construct additional facilities. When design is underway, engineers should size tanks for wintertime operation when conditions

are worse than normal. Sizing based on the average conditions is sure to cause problems when there is a long wet winter.

Personnel Paralysis: In many cases, utility personnel know what action needs to be taken to improve a system, but for a variety of reasons nothing ever happens. Sources of personnel paralysis are:

- Unclear direction from management;
- No sense of urgency;
- Inconsistent direction from management;
- Lack of proper training;
- Lack of authority to take needed action; and
- Lack of funding.

Solutions for the situation include:

- Clear direction from management;
- Local standards for effluent quality and maintenance;
- Training and accountability;
- Clear understanding of authority;
- Clear understanding of financial resources available; and
- Management support for operator initiative.

Utility Leadership Summary

Water and wastewater utilities are two of several basic services upon which cities are built. They also are very technical and capital intensive. Because of these differences from other municipal services the governance of water and wastewater systems often is passed to separate boards. No matter how they are organized, the importance of high quality leadership and management is the same. This manual is offered as a guide to those involved in leading and managing utilities.

Utility boards are involved primarily in implementing policy set by state and federal law makers. Only a small amount of utility policy is made locally. The local board is responsible for implementing laws and rules in order to provide drinking water and treated wastewater that meet quality standards. Meeting quality standards will assure you that the public and the environment are protected.

Because water and wastewater operations are so capital intensive, caring for the infrastructure also is very important. Most likely your city has more invested in these two services than all others combined. If the pipes, plants, tools and equipment are well cared for they will serve the citizens for years to come. If they are not cared for diligently, problems arise more quickly and premature replacement is necessary.

Perhaps even more important than the physical assets of the utility are the personnel who operate the system. Your water plant operators hold in their hands the health of the whole community. These operators should be very responsible and very capable. Distribution operators are responsible for maintaining water quality as the water flows from the treatment plant to the customers. They also are the ones who keep the water flowing on cold winter nights and hot summer days when ground movement causes pipes to break. Collection operators protect the health of the community by keeping sewage in the pipe. And sewer plant operators protect the city and citizens from the liability of their own waste because if you do not handle waste properly, someone will file suit against you. Each of these individuals or groups of individuals has a role to fill. They should know what is expected of them, they should have the proper resources and tools to work with, and they should be held accountable for fulfilling the utility's mission.

Public utilities are funded with public money. It is taxpayer money and ratepayer money. As public employees, we have a responsibility to be good stewards of this money. All decisions should have a financial element. We should ask continuously: Is this the best use of public funds?

To accomplish the mission of providing top quality water and sewer services, board members, managers and employees all must be involved in planning. For board members and managers, long-term planning and capital budgeting will be part of their regular tasks. Managers and supervisors will make plans for the year and for months and weeks. Operators and other employees may plan only what they will be doing tomorrow or the next day. Whichever planning horizon is appropriate for the role, making plans for the next day or task helps assure that the work will be successful.

Delivering high quality water and wastewater services at reasonable prices to customers over the long term takes hard work and determination. But it also can be a very satisfying endeavor. The two services are the most important services that a local government can provide because they are critical for our quality of life and for life itself.

Appendix A: Water and Wastewater Financial Issues: A Discussion with Example

Section 1: Water and Wastewater Financial Issues

Basics of the Financial Statements

City water and wastewater systems are accounted for by enterprise fund accounting. This means simply that we account for these operations in a way very similar to private business. Financial reports include a statement of net assets listing assets and liabilities, and a statement of revenues, expenses, and changes in net assets showing revenues and expenses. Assets are resources of the water and wastewater system, and liabilities are obligations owed. Net assets reflect the financial position of the utility.

The sample statement of net assets of Big Orange City, Tenn., shows the following assets: property, plant and equipment, cash, accounts receivable, and inventory. Property, plant, and equipment are the value of all your lines, pumps, buildings, vehicles, etc. Cash is the amount of money in your various bank accounts and investments. Accounts receivable are the water and sewer billing amounts currently due the utility. Inventory is the value of materials stored for repairs, replacement, and extension of your utilities.

Property, plant, and equipment are stated at a value of cost minus accumulated depreciation. Depreciation is important in enterprise fund accounting for a couple of reasons. One, it is required by state law. More importantly, setting your water and sewer rates to fund depreciation enables you to have monies available for equipment replacements, new plant purchases, etc. Looking at the depreciation value compared to the cost of the plant can also give you an idea of the age of the plant and equipment and possibly how much expansion is taking place.

The sample statement of net assets (Table 1) of Big Orange City lists the following liabilities: accounts payable, long-term debt, and notes payable. Accounts payable is the amount of outstanding short-term invoices the utility owes. Long-term debt is the amount of all outstanding principal owed on monies borrowed. Notes payable is the amount of all outstanding principal on short-term borrowing. Utilities should keep their accounts payable current by paying invoices owed on a timely basis. Some vendors even offer discounts if the payment is made within a certain time period, usually 10 days. Large debt balances can mean that the utility has recently borrowed a large amount of money. Having a large debt load may restrict the utility's ability to borrow more money if the need arises. Since the interest portion is an expense, having a lot of debt can be the major factor in operating with losses in net income.

While some analysis of the water and wastewater operation can be made from the statement of net assets, the primary financial instrument most staff and officials will be concerned with is the statement of revenues, expenses, and changes in fixed net assets (Table 2), formerly called the income statement. This statement is divided into three parts: revenues, expenses, and non-operating revenue/expense. Revenues are all the monies coming into the utility. Usually, revenues consist of sales (or user charges), which is the amount of

water and sewer customer billings. The city also may have listed other revenues, such as service charges, tap fees, or even simply other revenues. Generally, expenses are grouped into operating and maintenance expenses and depreciation. The total of revenues less expenses is the operating income (loss). Non-operating revenue/expense consists of interest income, interest expense, capital contributions, and any other miscellaneous income or expense. The operating income (loss) and the non-operating revenue/expense total the changes in net assets.

Table 1.

BIG ORANGE CITY WATER AND SEWER FUND STATEMENT OF NET ASSETS

ASSETS		LIABILITIES	
Property, Plant, Equipment	$10,454,891.36	Accounts Payable	$ 85,891.36
Less Depreciation	$ 4,528,520.99	Long-term Debt	$ 2,870,000.00
Net Property, Plant, & Equipment	$ 5,926,370.37	Notes Payable	$ 235,000.00
Cash—Operating	$ 22,548.79	Total Liabilities	$ 3,190,891.36
Cash—Investments	$ 121,454.70	Invested in Capital Assets Net of Debt	$ 2,895,286.07
Total Cash	$ 144,003.49		
Accounts Receivable	$ 40,540.12	Current Income (Loss)	$ 74,864.80
Inventory	$ 50,128.25		$ 2,970,150.87
Total Assets	**$ 6,161,042.23**		**$ 6,161,042.23**

Depreciation as It Relates to Plant, Net Income and Cash Flow

Depreciation is the expensing of plant and equipment over its useful life. For example, it may cost the utility $120,000 to expand a water line for new customers. The city could expect the line to last for 30 years, so each year $4,000 of the cost is expensed on the statement of revenues, expenses, and changes in fixed net assets. The same $4,000 becomes part of the accumulated depreciation on the statement of net assets. Since depreciation is not a cash expenditure, the amount of the depreciation is added back to the income or loss in order to determine how much cash is actually created by utility operations. City water and wastewater systems should set aside a portion of these funds each year in order to have monies to upgrade or replace plant and equipment as they age and wear out. Total Revenues $650,728.84

Table 2.

Big Orange City Water and Sewer Fund

Statement of Revenues, Expenses, and Changes in Fixed Net Assets

REVENUES	
Water Sales	$341,732.29
Sewer Charges	$295,748.30
Tap Fees	$5,000.00
Other Revenues	$8,248.25
Total Revenues	**$650,728.84**
EXPENSES	
Operating & Maintenance	$445,893.61
Depreciation	$100,000.00
Total Expenses	$545,893.61
Operating Income (Loss)	$104,835.23
Interest Income	$20,154.89
Interest Expense	($50,125.32)
Net Fixed Assets	**$74,864.80**

Collection Fee: Collecting past due water and sewer accounts also will cost the city money in personnel time and record keeping. Sometimes water services must be discontinued for nonpayment of the bill. Billing collection procedures should be put in place so that personnel know how to handle nonpayment situations and to ensure that all customers are being treated fairly. Customers who cost the city in the area of collections should be assessed a fee to recover those costs. Collection procedures should specify the types of fees and how much should be charged for each. This also will help encourage customers to make timely payments of their bills.

Section 2: Capital Budgets

One of the most important duties of operating a water and wastewater system is long-range planning for new lines, equipment and vehicle replacement, and new treatment facilities.

The simplest way to do long-range planning is through the use of a capital budget (or capital needs plan). The capital budget is a planning tool that projects the utility's capital needs for the next three to five years. The capital plan should be updated annually as projects are completed and needs change. Utility managers, engineers, and operational staff can work with city finance staff to develop the plan. You will need to have a list of projects and equipment with estimated costs and time frames for completion. This list can then be incorporated into a spreadsheet that will identify the revenue that will have to be generated annually by net income.

An example of a capital budget follows in Table 3. Projects for the Big Orange City water system have been identified and costs have been estimated. Also, the city staff has prioritized projects according to the year of projected completion. You will notice that some of the projects, such as water meters and the Summit Heights extension, are completed in stages over several years. This helps lower the strain on the city finances. Notice also that a new water plant is budgeted for fiscal year 2008-09. Obviously, few, if any, cities have the financial resources available in house to fund such a large project. By having the capital plan in place, the city can begin today making plans for this project. Engineering studies will need to be performed, and grants or loans will need to be secured to build the plant. By having the capital plan, the utility avoids waiting until the last moment to work on this large project.

Table 3.

CAPITAL BUDGET — BIG ORANGE CITY WATER DEPARTMENT

Project	F/Y 2005-06	F/Y 2006-07	F/Y 2007-08	F/Y 2008-09	F/Y 2009-10
Water Tank Replacement		$30,000			
State Street Line	$20,000				
New Pickup Truck			$12,000		
Summit Hgts. Extension	$20,000	$10,000	$10,000		
New Water Meters	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
New Water Plant				$3,000,000	
Smoky Ave. Line				$ 10,000	$25,000
New Backhoe			$20,000		
Total	**$45,000**	**$45,000**	**$47,000**	**$3,015,000**	**$30,000**

Capital projects sometimes arise that are not foreseen. A line has to be replaced, or a major piece of equipment must be purchased. Remember, the capital plan is a tool. You will need to revise the plan as these unforeseen expenditures arise. Perhaps you can delay another project or purchase. Or, you may need to consider borrowing funds to complete this work. One of the important things the capital budget will help you do is share information about work that is being done and how the utility's money is being spent. This, in turn, enables you to answer ratepayers as questions arise about rates and utility funds.

Section 3: Cash Flow: How Income, Debt, Capital Projects and Depreciation Affect Your Cash

Did you know that your water and wastewater fund can be generating net incomes, but your utility could still be broke because you have no money to pay your debts? That's because the principal payments on debt and the capital work being done can create more cash expenditures than the water and wastewater is generating from net income. Looking at the sample cash flow statement for the Big Orange City Water and Sewer fund (Table 4) will help us understand how these items work. You will notice that Big Orange City had a net income of $74,864.80. To this we add the depreciation expense of $100,000. As we have already seen, depreciation is a true expense but not one for which we directly expend funds. This gives us cash available of $174,864.80.

Borrowed money has a two-part cost: interest and principal. Interest is an expense and is already calculated in net income. But, the principal on the borrowed money is part of the balance sheet and must be paid for out of funds from net income. On our cash flow statement we show a subtraction of cash for principal on debt of $40,589.20. This leaves us $134,275.60 for our capital projects. If our capital work exceeds that amount, we will have to pay for it out of cash reserves (if any are available) or borrow more money. This is one reason it is so important to do capital planning. An important point to understand is that this is a very simplified cash flow statement, but it shows why it is important for utilities to review rates and have a long-term plan for their net income and capital needs.

Table 4.

BIG ORANGE CITY WATER AND SEWER FUND CASH FLOW

Net Income	$ 74,864.80
Add (+) Depreciation	$100,000.00
Total Cash Available	$174,864.80
Less (-) Principal on Debt	$ 40,589.20
Cash Available	$134,275.60

Appendix B: Example Schedules for Unaccounted-for Water Audit Manual March 2008

SCHEDULE OF UNACCOUNTED-FOR WATER
TOWN/UTILITY DISTRICT OF ANYWHERE

June 30, 2008

(All amounts are in gallons.)

A. Water Treated and Purchased		
B. Water Pumped (potable)	2,000,000	
C. Water Purchased	500,000	
D. Total Water Treated and Purchased *(Sum of Lines B and C)*		2,500,000
E. Accounted-for Water		
F. Water Sold	1,800,000	
G. Metered for Consumption	200,000	
H. Fire Department(s) Usage	50,000	
I. Flushing	10,000	
J. Tank Cleaning/Filling	7,200	
K. Street Cleaning	0	
L. Bulk Sales	0	
M. Water Bill Adjustments	2,000	
N. Other* (explain)	150,000	
O. Total Accounted-for Water *(Sum of Lines F thru N)*		2,219,200
P. Unaccounted-for Water *(Line D minus Line O)*		280,800
Q. Percent Unaccounted-for Water *(Line P divided by Line D X 100)*		11.232%
R. Cost per 1,000 Gallons of Water		$2.12
S. Cost of Unaccounted-for Water *(Line P divided by 1000 X Line R)*		$595.30

* Explain Other: Amount of water sold but not yet billed.

REFERENCES

American Water Works Association
6666 W. Quincy Avenue
Denver, CO 80235
Phone: (303) 794-7711
or (800) 926-7337
Fax: (303) 347-0804
www.awwa.org

Tennessee Department of Environment and Conservation
Division of Drinking Water Supply
or Division of Water Pollution Control
401 Church Street
L & C Annex, 1st Floor
Nashville, TN 37243-0435
www.state.tn.us/environment

Local Environmental Field Office
phone (888) 891-TDEC (8332)

Water Environment Federation
601 Wythe Street
Alexandria, VA 22314-1994
Phone: (800) 666-0206
Fax: (703) 684-2492
www.wef.org

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