Drinking Water System Management Handbook

Administration of a drinking water system through financial, technical and managerial planning.

Developed by the Environmental Finance Center at Boise State University for the Idaho Department of Environmental Quality

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The Environmental Finance Center

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For help on the "how to pay" issues of environmental compliance.

TABLE OF CONTENTS

INTRODUCTION

Water sustains all. – Thales of Miletus, 600 B.C.

When the well is dry, we know the worth of water. – Benjamin Franklin

These two quotes are irrefutable. There is nothing more important to sustaining human existence than water—specifically, pure and safe water to drink. Communities thrive because of their water supply. Not only does safe drinking water sustain individuals, families, neighborhoods and communities, it is one of the most essential requirements for supporting commerce.

All people appreciate having safe drinking water, but sometimes it is taken for granted. We recognize the worth of water when the well is dry, or it no longer flows readily, or when the quality of our drinking water changes. In the United States, one of the reasons customers may take safe drinking water for granted is that the overwhelming majority of water purveyors have done such a wonderful job supplying consistently safe water to the public.

The task of providing safe drinking water is not as easy as it would seem. That clear glass of tap water you drink today is not the product of luck, but rather the result of hard work on the part of the water system that provides it, as well as the work of those who set the standards for its quality and others who assist the water system in meeting those standards. And the jobs of those who oversee and direct the operations of water systems are destined to become more complex over time.

In formulating its strategy for assisting drinking water systems in Idaho, the Idaho Department of Environmental Quality (IDEQ) solicited the guidance of a citizen committee. One of the key recommendations of the committee was the creation of a handbook for newly appointed water system board members so that they could quickly "learn the ropes." This handbook has been designed to help officials who own water systems or serve on their boards of directors, understand the importance of their roles in providing safe drinking water. For newly elected or appointed officials, it provides an overview of key drinking water concepts and techniques to enable them to quickly understand the scope of their responsibilities. For experienced board members and officials, this handbook may be used to review those same concepts and techniques.

As a public water system owner, officer or employee, your decisions will affect the quality of life of not only the customers who receive water and pay their bill, but those who visit your community, its businesses, industries, schools, churches and other public places; or the homes of your customers. This handbook has been designed to improve your knowledge, give you the tools to gather additional information and to make good decisions on behalf of the public you serve.

THE LEGAL RESPONSIBILITIES OF LOCAL WATER OFFICIALS

The task of providing safe drinking water to the public carries with it certain legal obligations. This section of the handbook focuses on the legal setting that officials operate within and describes, in general, their responsibilities to meet these obligations.

The Legal Framework—A Short History of Drinking Water Quality Regulation

Obtaining safe drinking water is a fundamental human need. Throughout the course of history, man has been mostly successful in meeting this need, but not entirely so. Modern man has found it necessary to create rules of law to enhance the quality of drinking water.

In the United States the regulation of drinking water quality is relatively new—with the first national law enacted 1893. The federal government has been involved in regulating drinking water quality just a little more than 100 years. Here is a brief chronology of that regulatory history:

The Interstate Quarantine Act of 1893

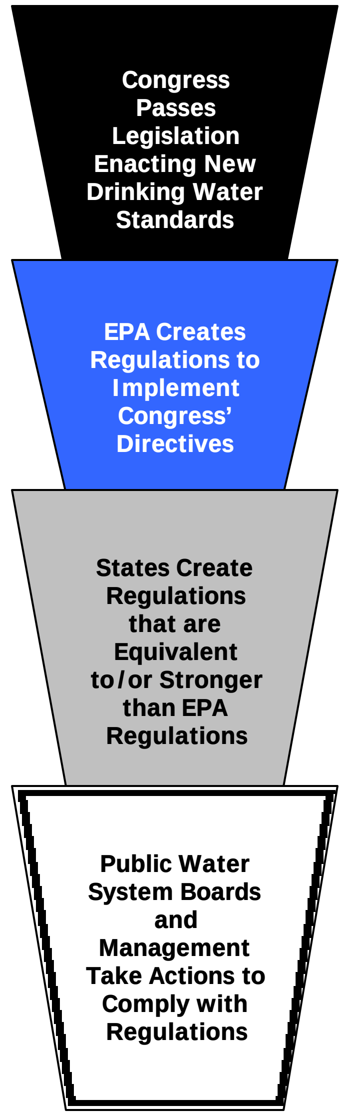
The Interstate Quarantine Act of 1893 was enacted as a response to outbreaks of waterborne disease during the Industrial Revolution. Persistent typhoid, cholera and other communicable disease outbreaks were increasing as more people moved to cities to work in factories. Administered by the U.S. Public Health Service, the Act allowed the government to control the transmission of communicable diseases. In 1912, the first drinking water-related regulation was adopted. It prohibited the use of a common drinking water cup on interstate carriers, such as trains and ships. In this century, buses and air carriers were added to the list.

Public Health Service Drinking Water Standards

In 1914, following the discovery of scientific evidence linking drinking water contamination and disease to bacteriological contamination, the first drinking water standard was adopted by the U.S. Public Health Service. As in the Quarantine Act, the standard applied only to interstate commerce carriers. The standard established an upper limit for the allowable concentration of bacteria in drinking water. This standard and others to follow, became known as the *Public Health Service Drinking Water Standards*.

Up until 1969, the *Standards* were revised many times as scientific understanding about drinking water quality increased. The 1962 standards, which regulated 28 substances, were the most comprehensive federal drinking water standards in existence to date. Again, the *Standards* only applied to water systems that provided water to interstate carriers. All 50 states adopted the standards as guidelines or regulations for their public water systems.

The Regulatory Process



President Nixon Establishes the EPA

In response to increased public awareness and concern about pollution, President Nixon established the U.S. Environmental Protection Agency (EPA) in 1970 to create and enforce environmental policies. The EPA's Office of Groundwater and Drinking Water, along with its partners, administers the SDWA and its amendments.

The Safe Drinking Water Act

Congress focused its attention to create a national drinking water protection law following reports of the level of contaminants found in New Orleans' drinking water. The Safe Drinking Water Act (SDWA) of 1974 was created to ensure that drinking water supplied to the public is safe. The primary authority that the Congress used to create the Safe Drinking Water Act of 1974 was the "Interstate Commerce Clause"—an authority given to Congress by Article I of the United States Constitution. The SDWA regulates all water systems with at least 15 service connections or regularly serving at least 25 people. States can decide to regulate even smaller systems. For example, Washington State determines that systems with as few as two connections are public water systems. The SDWA also applies to privately owned community water systems, such as mobile home parks, recreational home parks, and water companies. The Act is also enforceable upon non-community systems, such as day care facilities, schools, businesses and campgrounds.

The 1986 SDWA Amendments

The SDWA was amended significantly in 1986 to strengthen standard-setting procedures, enforcement authority, and groundwater protection provisions. Congress directed to substantially and quickly increased the number of regulated contaminants. The 1986 Amendments also required all public water systems using surface water sources to disinfect and, in almost all cases, to filter their water supplies. The implementation of these amendments was the figurative "straw that broke the camel's back" for municipalities struggling to meet federal standards without receiving more federal financial assistance. The "Unfunded Mandates Revolt" of the 1990s, led by the National League of Cities, was a product of the 1986 SDWA Amendments.

Significant Changes and Key Project Areas Under the 1986 SDWA Amendments

- Great increase in the number of regulated contaminants.
- Expansion of regulations to include non-transient, non-community water systems.
- Increase in monitoring for organic chemicals.
- Provision for waivers and exemptions from chemical monitoring.
- Establishment of more stringent coliform monitoring requirements.
- Tightening of requirements for the treatment of surface water and groundwater under the direct influence of surface water.
- Establishment of lead and copper regulations and corrosion control requirements.
- Increase in requirements for public notification and risk communication.

- Initiation of a groundwater protection program, including the wellhead protection program.
- Provision of funding to identify and provide the special protections needed for sole source aquifers.

The 1996 SDWA Amendments

Within ten years, the 1996 SDWA Amendments, sponsored by Senator (now Governor) Dirk Kempthorne were designed to help relieve the effects of the 1986 SDWA Amendments while further protecting public health through regulatory improvements, increased funding, prevention programs, and public participation. The EPA is currently implementing many of the requirements of the 1996 Amendments with its state partners through regulations established by the EPA and adopted or referenced by the states. Among these are the creation of Consumer Confidence Reports, and expanded Water Source Protection Planning.

One of the most significant amendments to the SDWA relate to the movement to improve the ability of drinking water systems to provide safe drinking water to the public. States were required to develop strategies to assist systems in improving technical, financial and management capabilities. This handbook is a product of that strategic plan.

Significant Changes and Key Project Areas Under the 1996 SDWA Amendments

- Selection of regulatory priorities determined based on public health risk.
- Flexibility for states to implement the Act.
- Additional funding for states and some public water suppliers through the drinking water state revolving fund (DWSRF).
- Funding for new state prevention initiatives, including source water assessments.
- National minimum guidelines for states regarding the certification of operators of drinking water systems.
- Water system capacity development program, especially for small systems.
- Increased drinking water protection through government accountability and public understanding and support, including consumer confidence reports.

The regulations that implement the SDWA are called the National Primary and Secondary Drinking Water Regulations. These regulations may be found in the Code of Federal Regulations, Title 40, Parts 141, 142, and 143.

Regulations Implementing SDWA (1974 Act and the Amendments of 1986 and 1996)

The regulations that implement the SDWA may be found in the Code of Federal Regulations, Title 40, Parts 141, 142, and 143. These are commonly known as *the National Primary and Secondary Drinking Water Regulations*. EPA has established maximum contaminant levels (MCLs), treatment techniques, and best available technologies to ensure the treatment and delivery of safe drinking water for the public. More than 100 substances are regulated under the SDWA, with more being added each year. For many contaminants, initial monitoring is performed and, if results are within certain parameters, future monitoring is thereafter limited. For bacteriological contaminants, however, monitoring and treatment requirements are extensive and continuous. Water treatment plants can demonstrate effective treatment of water by monitoring and reporting laboratory analysis results of contaminants, including: volatile organic compounds (VOCS), synthetic organic compounds (SOCS), inorganic compounds (IOCs), total coliform, turbidity, disinfection by-products, lead and copper, and radionucleides. If MCLs are exceeded, there are specific actions that the water system must take.

The State of Idaho's implementation of the National Drinking Water Regulations is effected through adoption of state regulations. Idaho Rules for Public Drinking Water Systems may be found at IDAPA 58.01.08 (these rules are available on the Internet at http://www2.state.id.us/adm/adminrules/agyindex.htm) For detailed information about how the rules and regulations affect your system, please refer questions to your certified operator or engineer. Your IDEQ field office or health district office may also provide this information.

Legal Responsibility

The fundamental responsibility of water system officials is to provide safe water to the public. Because there is a legal framework for the provision of safe drinking water in this country, water system boards and officers must be knowledgeable about the rules to follow. Not only the rules that are in effect today, but also how those rules, regulations, standards and practices may change in the future. It may be difficult to know exactly how and when a water system officer or board member may be held liable for the activities of the water system—especially because of the complex nature of the regulations. However, knowing the legal framework makes a big difference toward being successful.

To better understand liability exposure, water system officers should be aware of the authority they grant to employees to act on the board's behalf. In a water system, the officers and/or the board of directors are the principals in charge. Employees of the system act at the direction of the board, as the agents of the principal. That direction may be explicit or implied. Sometimes there is a lack of direction due to a lack of policies or other statements of authority. The important thing to remember here is that the principal is responsible for the action of their agent so long as the agent is operating within their scope of authority. Policies help establish the scope of authority. Typical sources are job descriptions, departmental or divisional organizational charts, collective bargaining agreements, personnel regulations, contracts or implied contracts with employees or outside laboratories, ordinances, memoranda, and bulletins or advisory guidelines.

Legal Responsibilities

- Carry out "Rules and Regulations" or system policies (these vary from community to community);
- Comply with applicable federal and state laws, and local laws and ordinances;
- Conduct business and make contracts as a board (not as an individual); and
- Ensure that all documents (records, minutes, notices, etc.) are created, maintained and made available in accordance with state and federal law.

Financial Responsibilities

- Use diligence and care when exercising rights and powers for, and on behalf of, others;
- Use appropriate accounting, purchasing, and recordkeeping standards in all transactions (methods and procedures may be dictated by the utility commission in some states); and
- Ensure that system revenue covers system operations, debt service, and reserves. (The local official must provide a legally and financially defensible, non-discriminatory rate structure which, along with other non-rate revenue sources, should cover the cost of providing water.)

From The Water Board Bible, *published by the Kansas Rural Water Association (1993; Miller, E.G. & Ronnebaum, E.)*

Liability Exposure

If a water system fails to meet the requirements of a regulation, the regulatory agency may take action—including legal action—to force the system to comply. In the drinking water arena, it is possible that others beside the regulators could take action against the board if they feel they have been injured. The Safe Drinking Water Act provides that citizens can bring suit against a system for not meeting MCLs even if the regulatory agencies take action.

Some consumers may be more sensitive to contaminants in their water than others. For example, cancer patients and others with suppressed immune systems may be more sensitive to certain MCL violations than otherwise healthy people. Similar arguments may be made for infants, children and the elderly. Restaurants and other similar water customers may also take action against the system, as well as hospitals and other types of care facilities. In these examples, their cases might have standing in court; since it may be argued that these water users had been actually suffered injury that the general public (or general customers) would not. For these reasons, it is important for water systems to have not only a good knowledge of the legal framework of safe drinking water, but also to have access to legal advice when necessary.

Water System Capacity

The previous section helped to explain the changes in the legal framework that help guide water systems and the regulatory community in assuring that safe drinking water is produced and served by the thousands of public water systems in the United States. As noted there, the 1996 Safe Drinking Water Act Amendments speak to the issue of water system capacity and improving this capacity. What does "capacity" mean according to SDWA?

What does "capacity" mean according to SDWA?

Traditionally, the term "capacity" referred to the capability of a water system to produce a certain amount of water at the correct level of quality based on the technical characteristics of the system. In the last ten years or more, the work of organizations such as the American Water Works Association and others, including the EPA, indicated the ability of water systems to meet regulatory benchmarks relied on more than just technical capability. They showed that regulatory compliance also depended upon adequate management and finances. It was argued that water systems that were most likely to stay in compliance would have all three capabilities in adequate measure—technical, financial and management capacity. Persuaded to incorporate capacity development in the 1996 SDWA Amendments, Congress also tied new financing opportunities (the Drinking Water State Revolving Fund Program) to capacity development.

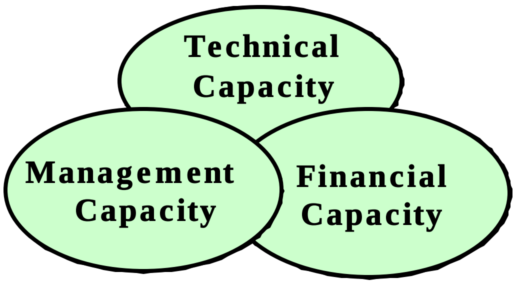
Managerial capacity is the personnel expertise required to administer overall water system operations. It refers to the management structure of the system, including ownership, staffing, organization, and accountability. Financial capacity is generally thought of as having the monetary resources to support the cost of water system operations. This means having the financial resources as well as the financial and management controls in place to see that those resources are used wisely.

What Capacity Means for Water System Officers

Technical, financial and managerial capacity overlap. This means that technical capacity isn't possible without financial capacity—the facilities cannot run without money.

Water System TFM Capacity

Water systems with adequate Technical, Financial and Management Capacities are less likely to have compliance problems.



Financial issues and management capacity overlap as well. Management of the water system's technical capacity is equally important. Traditional measures of performance—such as, meeting MCLs through testing—used to be the "bottom line" measure of the water system's condition. Expanding the definition of capacity means that other indicators can be used to express the ability of a water system to provide safe water efficiently and effectively over the long term.

Through the lenses of **TFM** (**T**echnical, **F**inancial and **M**anagement Capacity), managers and board members are now able to view the condition of their water systems holistically. Ideally, they will monitor their system with a broader set of sensors. This means that they will be able to react to that information and make better decisions to operate in compliance, and with less intervention from regulatory agencies. If this happens, over time regulatory agency efforts will also shift from an enforcement orientation to a technical assistance model as water systems seek constant improvement.

In the past, the term of art was "viability," and the key question was: "Is this system viable?" The answer was always black or white, yes or no. Think of capacity as you would your golf game. No matter what your level of play (or capacity), the goal is to always improve. Water system TFM capacity is very much like that. No matter what your level of capacity is; it can always be improved.

Water System TFM Capacity

Technical capacity means that the water system has the necessary technical infrastructure and competent trained staff needed to comply with drinking water regulations.

Financial capacity means that the water system possesses the financial resources needed to comply with drinking water requirements for both the short and long term.

Managerial capacity means that the water system has the institutional and administrative resources needed to comply with drinking water regulations.

RUNNING THE WATER SYSTEM LIKE A BUSINESS

Water has become a highly precious resource. There are some places where a barrel of water costs more than a barrel of oil. – Lloyd Axworthy, Foreign Minister of Canada (1999)

This next question may seem a little bit odd. Is it possible to imagine any business-type enterprise that shouldn't be run like a business? Even faith-based institutions are run like businesses these days. And though the scholars debate whether government should be run as a business, public administrators know that there are governmental activities that are required to be operated as enterprises. By accounting standards, government-owned utilities are required to be run like businesses.

Customers benefit when water utilities are operated in a business-like manner.

Whether public, private or not-for-profit, customers benefit when water utilities are operated in a business-like manner. Businesses succeed when they know who their targeted customers are and know what they want; when they are able to produce what the customers want in a cost effective manner; and when they can identify—and to the greatest extent possible—reduce the risks to their ability to survive in the marketplace over the long term. Successful businesses try to reduce uncertainty, both internally and externally, by being proactive in their use of information to reduce risk. This is the management imperative that water systems can adopt as well.

The Management Imperative: Part One

By the command of law and regulation, water system board members and officers are obligated to deliver safe drinking water to their customers. It is clear that if the product is not safe to drink, that some kind of corrective or legal action could be taken. It is imperative then, that the water system owners, officers, and board members think about those things that could affect their ability to produce and deliver safe water. What can a water system do to minimize those things? Without good management, a system will not be able to sustain future challenges.

Risk and Uncertainty

In the real world, there are a variety of actions that could affect the water system. The most important thing a water system team can do is to identify them. Negative actions can be divided into two broad categories - risk and uncertainty. Risks to a water system's ability to serve safe water can be identified, measured and calculated to some extent. Uncertainty can generally be defined as those things you can't really confirm as a risk and would occur randomly. "Acts of God" such as those related to weather and other unknown events certainly fall into this category.

Most of the problems experienced by utilities that use an "as the need arises" approach to operating crises are caused by a lack of foreseeing risks and their possible financial ramifications.

Uncertain Events

A vivid example of uncertainty is the terrorist acts of September 11, 2001. The world was shocked by the destruction and horror caused by the use of commercial aircraft as missiles. Despite the design of the World Trade Towers to resist the impact of an *accidental* aircraft collision, it was outside the known realm of certainty that this would occur. On the other hand, New York Port Authority and FBI officials had identified the *risk* to the buildings of smaller bomb blasts based on previous events. Today, due to the unfortunate record of 2001, these previously inconceivable and uncertain events have moved into the realm of certainty. And depending upon a variety of signals, these types of events have the characteristics of risk;

they are identifiable, measurable and calculable. Water systems face uncertainty, but the majority of actions that affect them fall into the category of risk.

Risk

A system that is run like a business is going to want to know what the risks are to serving safe drinking water consistently. Those systems will take the time to identify and inventory those risks, and attempt to measure and calculate the impact on their operations. The management team will want to take action to reduce the impact of those risks, to minimize the negative effects on their ability to serve safe water.

Virtually all risks can be translated into a form of financial impact.

Virtually all risks can be translated into a form of financial impact. For public water systems that are also investor-owned and price-regulated by Public Utility Commissions, a risk to the system can also be a risk to their ability to be profitable. An ignored risk—for example, an increase in the costs of chemicals for treatment—impacts the bottom line. In this example chemical cost increases can be identified, measured and calculated.

Internal and External Risks

Water systems that take the time to thoroughly inventory risks will find that things that seemed like uncertainties in the past can be managed as certainties in the future. Risks can also be generally divided into two groups—internal and external risks. For example, think about the forces at work on your family budget. If you think about the family budget as a road map or plan to get you through the next month or year, then you can begin to inventory the internal and external events (risks) that might prevent you from meeting your goals. Internal risks to the budget plan might be a need to replace an appliance or keeping up with your teenager's food consumption. External risks could be a variety of things, increases in the cost of living (gasoline, food prices, utility costs), changes to your rate of pay, adverse changes in tax rates, etc.

A water system faces the similar internal and external risks. Internal risks are unique to every water system, although some are universal. Internal risks could include such things as increases in personnel costs (especially in the fringe benefit area), costs associated with levels of service, etc.

External risks could include the following:

- Changes in drinking water regulations. Changes in the legal environment that water systems operate within can and should be considered as external and measurable. Water systems that recognize how regulations affect their operations, can also prepare for the impacts—financial and otherwise—that regulatory changes might cause.

- Changes in operational cost factors. There is always a risk that the externally imposed costs of operational and administrative cost elements could have a negative financial effect. Market-based increases in the costs of supplies and materials on the operational side, and administrative cost increases for everything from professional services to the price of stamps have a financial impact.

- Changes in the customer base. An increase, decrease or change in the demographic characteristics of the water system's customer base is an external risk. Water systems should also watch for changes to the economic condition of the community and/or customer base. A closure of a local business due to a downturn in the economy could cause significant unemployment that could result in a loss of customers and/or an increase in overdue utility payments.

These are just a few examples of internal and external risks, but they demonstrate the need for water system board members, managers and *other team members* to be aware of the risks involved in producing safe water. We emphasize "other team members" because everyone who is involved in the water system can offer a unique perspective about risks and opportunities to mitigate those risks. This leads us to a discussion of risk management.

Risk Management

Risk management is the technique of proactively identifying and calculating the effect of negative events, assessing the consequences of actions that might be taken to minimize the effects or those negative events, and then making decisions to choose which action or actions to take. If your water system has never approached the task of reducing the risks to the deliver of safe drinking water to your customers, the best time to begin is now. If risk management is being done, then a review of existing identified risks and a survey of the landscape for new risks is in order.

Waiting to reduce risks is a gamble water systems can't afford to make.

Process

If a risk management has not been implemented for your water system, it will be time consuming the first time it is done. Fortunately, in subsequent years the process will be incremental, building off the investment of time and hard work expended in prior years. Whether starting from scratch, or building on a base of information, the risk management process can be simply stated as follows:

1. Identify the team that will be involved in risk management discussions and decision-making.
2. Create a list of internal and extemal risks to being able to produce and deliver safe drinking water on a consistent basis.
3. Assess the risks (see Risk Analysis Matrix).
4. Construct actions that might be taken to minimize the risk effects.
5. Select action options.
6. Implement action options.
7. Monitor and report on the results associated with each action.

The following matrix can be very useful in assessing risk. Two characteristics are tracked; the *likelihood* of the risk actually occurring, and the relative *severity* of the risk event should it occur. Once identified, each internal and external risk should fit somewhere on the matrix. Every risk event located in upper right cells (high impact/unlikely, high impact/likely, high impact/highly likely, medium impact/likely, and high impact/highly likely) should be given special consideration.

Risk Analysis Matrix

Impact of the Risk					
	High				
	Medium				
	Low				
		Not Likely	Unlikely	Likely	Highly Likely

Likelihood of the Risk Event Occurring

Summary

Running a water system like a business is not only what customers want (and assume), but is an appropriate approach given the complexity of the task of producing and delivering safe drinking water. In doing this, water systems will want to reduce the risks involved in running the water system. A systematic approach to identifying internal and external risks contributes important information for decision makers and contributes to the effectiveness of short and long-term planning.

RUNNING THE WATER SYSTEM LIKE A BUSINESS: THE ANNUAL BUSINESS CYCLE

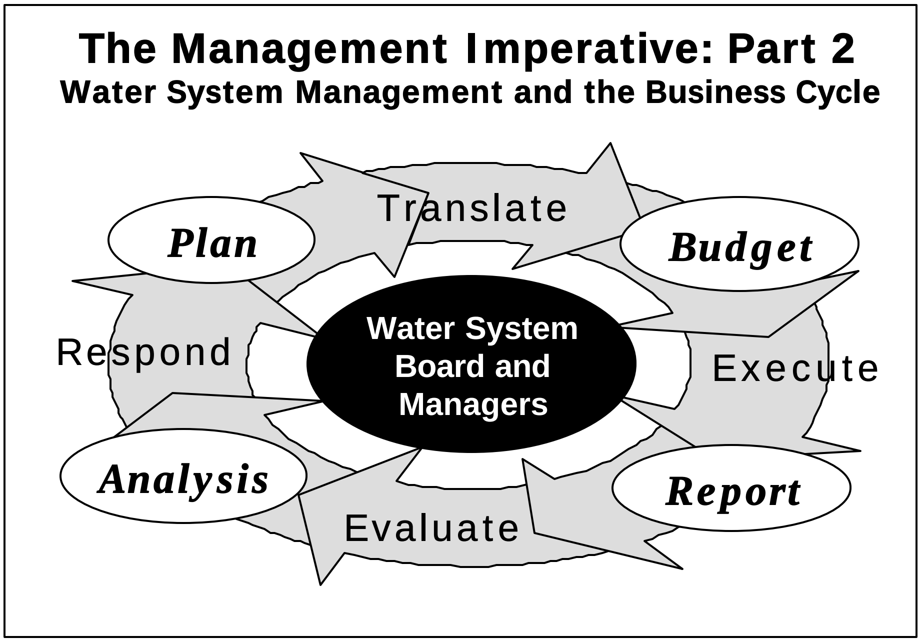
The last section presented the rationale for understanding and controlling the risks associated with running a water system successfully. Here, we examine the characteristics of the annual business cycle and how water system board members and managers participate in the phases of the cycle. We will review the benefits associated with proactively setting and then implementing a course of action for the system.

The Annual Business Cycle

The annual business cycle depicted in the *Management Imperative* graphic. This cycle is presented in its classic form and the four key functions in the cycle are: plan (Planning), budget (Budgeting), report (Reporting) and analysis (Analyzing). We'll describe each of these functions in more detail in this section. Between these key functions are actions that allow the business to move smoothly from one function to the next. The actions are:

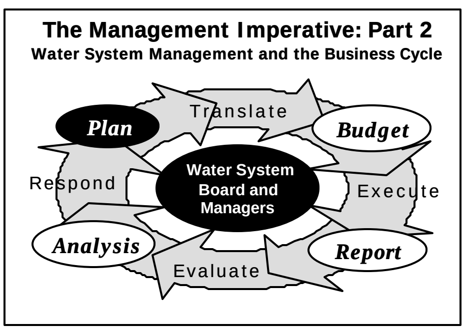
- Translate (moving from a plan to a budget),
- Execute (taking the budget authority and putting it into action),
- Evaluate (monitoring the reports of budget activity and checking to see that that everything is on track)
- Respond (taking action on the analysis of the years activity and preparing for the next cycle)

Notice that the water system board and management are in the center of this process. Ideally, they would be in the middle of all of these events to ensure that the course they have set for the water system in the planning process is successfully achieved. The annual business cycle is the second part of the so-called *Management Imperative*. Again, the success of the water system during the annual business cycle depends upon the active participation of the management team every step of the way.



Step 1: Plan

The cycle really begins in the upper left-hand corner at "Plan." Planning is simply the process of deciding where the water system is going to be in the next year and future years. The plan sets the course of the water system over time. Planning can be an elaborate process requiring specialists in the planning field who know both the nature of the business and the variety of planning methodologies and techniques that could be applied. Or, planning may be more informal, with the function carried out by existing staff and officers in a more informal way. Sometimes planning is avoided altogether because it is thought to be an expensive luxury in terms of time and money. Regardless of the planning resources available, this function of the business cycle can be simplified to three steps - determining the organization's mission, setting goals and formulating objectives to meet those goals. Let's look at how these steps apply to the typical water system.



Determining the Mission

The purpose of the organization practically determines its mission. You would expect that a newly established organization might have to take some time to clearly define its mission. In the case of public water systems, the mission has long been established. For example: The mission of the Gem Creek Homeowners Association Water System is to produce and serve the highest quality water possible at the lowest possible cost. For this system the mission is clear, to the point and easy for everyone to remember. Ideally, the mission shouldn't change from year to year. The other two steps in planning relate to the mission.

Setting Goals

If an organization has a mission and a purpose, how does it intend to carry out its mission? Gem Creek HOA has a clear mission, but it can't stop there. It needs goals in order to put that mission into action. Their original goals may have been to build the water system and provide service to their customers. This coming year the goals could be different. This year the goals may include maintaining and operating the existing system and a new goal relative to system expansion. An annual review of goals—to see if the last goals have been accomplished and to set new goals—these are the last and first steps in the business cycle.

Formulating Objectives

When an organization set its goals, it has established broad statements of expected accomplishment. The third step in planning is to break down those broad goal statements into a variety of smaller tasks called objectives. Linked together, objectives are the specific implementing steps of the goals of the organization. Each objective may have a corresponding set of tasks, and each objective has its own resource requirements. It is at this level of planning that the management team begins to move into the next step in the annual business cycle—the budget.

Why Plan?

With few exceptions, public water systems in the State of Idaho are not *required* to plan. The exception is that water systems requesting funding from the Idaho Drinking Water State Revolving Fund are required to present a multi-year capital improvement plan and a capital improvement budget related to the plan. So, if it's not required, why plan?

A plan shows that the water system knows what it needs to do and how to accomplish the needed changes.

It gets back to running the water system as a business. The plan helps the water system set a course through the year and, for certain functions, several years. The plan sets the course, which is translated into a spending map or budget.

The management team uses the budget and other performance indicators throughout the cycle to:

1. Determine if the water system is on course
2. Decide if their goals have been accomplished
3. See if performance is better or worse than expected
4. Analyze what happened
5. Respond to those changes
6. Then plan accordingly for the next annual cycle.

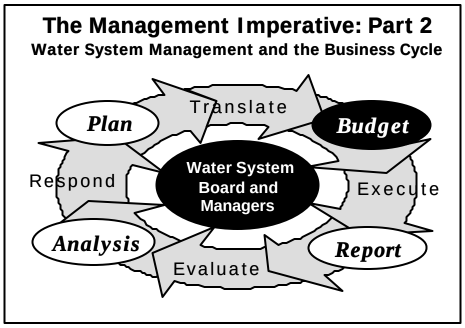
A water system's plan helps the management get to where they're headed in the future. If a water system is relatively static, or isn't expected to grow; is now and in the future expected to meet regulatory requirements, and won't experience any increases in costs or declines in revenue, or a change in the management team—then it probably wouldn't be a candidate for planning. But, how many systems have those characteristics? One of the answers may be all of those systems that ignore the myriad of changes that affect them. Reality shows that water systems are not static.

Why plan? Planning helps the water system management team stay true to their mission of providing quality drinking water and puts them in the driver's seat over the course of time. Planning helps the management team be proactive—rather than reactive—in guiding the system through the internal and external events (risks) that it may face. Moreover, when the time comes for a system to seek financial assistance, the plan helps to indicate that this business knows what it needs to do and has a way to go about doing it. The plan gives outside examiners confidence that the business can receive financial resources and make good use of them.

How Risk Management Information is Used in Planning

In the previous section, we discussed the need for and the utility of risk management information for decision-making purposes. In the annual business cycle, risk information is used in the planning stage when determining which internal and external risks could have a direct impact on the budget. Since each risk event has a corresponding decision action, these actions can be summarized into a spending plan, which becomes part of the annual budget or the multi-year capital budget.

Step 2: Budget

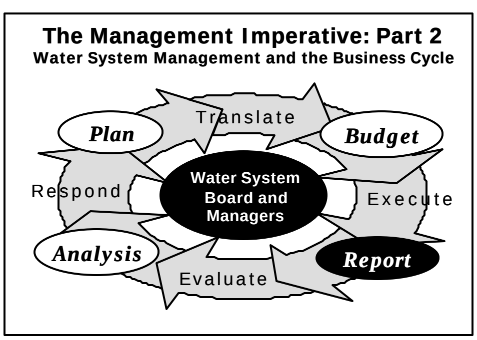


Once the water system's plan has been established, the resources must be gathered to accomplish the goals and objectives. In the plan, the management team has determined what it wants to do. In the budget, they establish the financial resources to accomplish their goals. Every objective and task has some need for resources in order to be achieved. The budget is where these resource needs are organized. Simply stated, the budget is the plan for how money is raised and spent during the business cycle. Many water systems have two budgets, their annual operational budget and a capital budget. The annual operational budget includes the revenue and expenditure plan for meeting the goals of the system for the current year. The capital budget is usually a multiple-year plan for larger expenditures that are scheduled in the current and future years. For example, the water system's goal of expansion to serve more customers may require several years to accomplish. The revenue and expenditure plan for those years would be found in the capital budget.

In its basic form, the budget is comprised of two parts—a revenue budget and an expenditure budget. The revenue budget is the plan for acquiring resources. Typical revenues for water systems include customer user charges, hook-up and connection fees, interest earnings, etc. Capital budget revenues include monies from loans or bonds, contributions of capital, grants, etc. In either budget, the revenues set the limit to the resources that are available to spend in meeting the system's goals.

The expenditure budget usually contains more detail. The expenditure budget is the division of the revenues among a variety of resources that are "purchased" to accomplish objectives and tasks. Annual budget expenditure categories include operations and maintenance, administration, professional services and capital improvements (from the multi-year capital budget). Examples of operational costs are personnel, utilities, chemicals, tools and equipment.

Step 3: Report



Once the budget is designed, discussed and approved, implementation of the goals, objectives and tasks begins. The budget is in the "execution" stage. As resources are received and spent, transactions are recorded and reports of the transactions are created. These reports, usually produced on a monthly basis, help the management team determine whether the water system is on track to accomplish its goals.

Accounting

Budget transactions are recorded in the water system's corresponding accounting system. The function of accounting is to record information that contributes to the safeguarding of the water system's physical resources—both fixed assets and cash.

Accounting transactions are the basic building blocks of the financial record keeping, financial reporting, operational and management information systems of the water utility. Transformed from individual transactions to useful reports, accounting transactions help water system managers determine the ongoing needs of the system, how much money is being received and spent and how to determine if the water system is operating efficiently. Accounting systems also form the basis of internal controls of the resources available to the water system.

Source Documents

When looking at the basic building blocks of information, it is useful to think about source documents and how the financial information related to them can be used in an accounting system. All of these records should be retained for auditing purposes. The water system's accountant or auditor can recommend specific retention schedules for source documents.

Examples of source documents are:

- Receipts (from customers and others) that indicate that resources have been received.
- Invoices for payment (by the water system, or from others).
- Checks.
- Personnel-related Documents (such as time sheets, etc.)
- Non-Monetary Information that combined with financial records would help to explain the performance of the water system.
- Other Source Documents recommended by the system's auditor.

Transforming Source Documentation to Financial Reports

The key to making appropriate management use of source documentation is to transform the information on the records to a standardized accounting system. Every source document can be **categorized** and reported to a **standard chart of accounts**. The chart of accounts is a list of the water system's accounts with a corresponding numeric or alphanumeric coding system. Source records are examined to determine which account they should be **recorded** to. Using the chart of accounts, transactions are translated as assets, liabilities, equities and revenues. Each source record indicates a financial transaction.

For example, a customer writes a check as payment for water services. The water system issues a receipt to the customer for the payment. The receipt is retained by the water system and contains information for recording in to the accounting system (the check is not retained by the system, it is sent to the bank, processed and eventually returned to the customer). The receipt records the date of payment, the person making payment, and could include the account into which the payment is to be received; most likely the "accounts payable" account.

All of the transactions can be recorded consecutively in a journal. The journal is usually set up to contain one month's transaction activities. At the end of the month, the journal contributes information for the general ledger, which is used to check the cash account (this includes the water system's checking account) against the monthly bank statement. Eventually the journal and ledger information contributes to periodic financial reports that the management team can use to make decisions. The auditor should review the journals, ledgers and other financial information for accuracy. The source documents then should be retained for such review purposes.

Other Source Information

Water system management teams can combine financial information with other information that would be useful in reporting operational activities. These can become benchmarks against which current performance can be compared. Examples include:

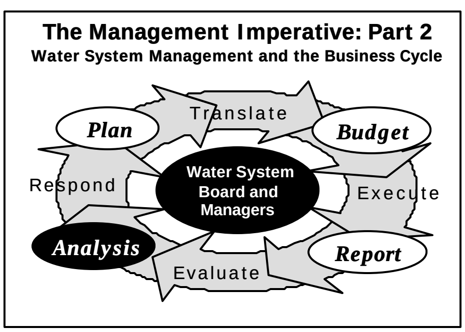
- Total gallons pumped, treated and metered.
- Gallons pumped per customer group.
- Number of calls regarding interrupted service.
- Number of customer complaints.
- Number of employee hours.
- Unaccounted water

Reports

Many water systems have part-time board members who have a limited amount of time each month to spend in meetings. However, members of the management team need to be well informed about the system's progress toward meeting its goals and objectives. What kinds of reports might be useful? Using the budget as a benchmark, two reports could form the basis of financial reporting—monthly revenues and expenditures versus budget, and year-to-date revenues and expenditures versus budget. Other useful reports might relate to specific revenue and expenditure categories such as user charge receipts, and personnel or power and chemical expenses. The bottom line on reporting is that if the basic building blocks of information are available, then a report can be generated. Management teams may wish to experiment with reporting by capturing and summarizing information related to key goals, objectives and tasks.

Step 4: Analysis

The last step in the annual business cycle is analysis. Analysis is defined here as making good use of the information generated through reporting systems as the water system begins to plan for the next business cycle. The purpose of analysis is to help inform the planning process for the next business year. Among the key questions are:



- Have we accomplished our goals for this business cycle? If not, will that affect the formation of next year's goals?
- Were our budgets accurate? What did we learn from our budget performance that we need to think about in the next budget cycle?
- Were are assessments of risk accurate, and do we need to reassess any risk events for the next year?

By asking these questions, the water system team learns more about their system and their overall capacity to achieve their mission. The annual business cycle ends with an action component—respond. The analysis step, and the team's response to what has happened in this annual cycle, will be an important investment in the next cycle. In preparation for that next step—planning—the team can respond to what decisions they need to make, what their options are in making those decisions, the pros and cons associated with those options and selecting the best actions and planning to implement those actions through next year's set of goals objectives and tasks.

TECHNICAL, FINANCIAL AND MANAGEMENT CAPACITY: Measuring and Improving Water System Capacity

Now that we have examined the legal framework of drinking water provision and the keys to the annual business cycle, it is helpful to revisit the issue of water system capacity. The following sections focus on the importance of water system capacity, how to measure it, and how capacities can be improved.

Technical, Financial and Management Capacity

The 1996 Amendments to the Safe Drinking Water Act (SDWA) have established that systems that have sound technical facilities, good financial condition and controls, and proper management are likely to provide safe drinking water on a sustainable basis. For over twenty-five years, the guidelines for designing, building and operating water systems have been in place. The body of knowledge relative to the technical capacity of water systems dominated the industry.

Until the 1996 SDWA Amendments were passed, financial affairs of water systems were largely discussed between water system officials, their customers—in the discussion of user rates—and financiers who provided the capital for water system creation, upgrades and expansions. SDWA recognizes the importance of financial capacity as a key to compliance.

Related to technical and financial capacity, the ability of the system to operate efficiently and effectively is linked to the people who are responsible for the system; the professional staff, managers, board members (officers). The EPA defines managerial capacity as "the institutional and administrative characteristics of a water system that enable it to achieve and maintain compliance with SDWA requirements."

Idaho Indicators Of TFM Capacity

Technical Capacity

- Condition of water treatment facilities
- Condition of existing water sources
- Water source capacity
- Condition of water storage, pumping and distribution facilities
- Condition of existing water storage facilities
- Water distribution line leak repair experience
- "As Built" drawings exist and are on file at DEQ
- Violations information

Financial Capacity

- Revenues meet or exceed expenses
- Current affordability index
- Future affordability index
- Cash budget
- User fee review
- Guidance for user fees
- Annual budget
- Capital budget
- Capital improvements plan
- Financial audits
- Bond Rating

Managerial Capacity

- Certified operator
- Board of Directors
- Formal communication
- System policies
- Professional engineer
- Attorney
- Record keeping

Measuring Capacity

The 1996 SDWA Amendments give the states the authority to determine the measures of water system capacity. Most states have utilized EPA guidance to fashion capacity measures and indicators. States have traditionally collected information about the technical characteristics of their water systems—water-testing results, engineering records, etc. The state regulatory agencies and their contractors also normally conduct sanitary surveys of water systems. The sanitary survey is a good source of information about the condition of the water system facilities and whether improvements are necessary to meet regulatory requirements. The Department of Environmental Quality's *Technical Assistance Handbook* has a tab where your system's most recent sanitary surveys may be filed. Technical capacity is fairly easy to measure because of the operational standards and benchmarks that have been developed over time.

Since financial capacity is based upon financial records, clear measures of fiscal capacity and financial management have been developed. Financial information, especially that derived from audited financial reports, can be used for indicators of financial condition.

Financing agents such as lending institutions, and governmental lenders use measures of financial condition routinely. The goal of capacity development is to use these measures to diagnose financial condition on an ongoing basis, even if a water system is not seeking financial assistance. While financial condition is not *directly related* to the ability to produce and serve safe drinking water consistently, it does correlate with the ability to withstand risk and uncertainty. Water systems with poor financial indicators are not as likely to resist dramatic changes in their operating environment.

It is becoming more apparent that in being able to meet the public's demand for safe drinking water, the human element makes the biggest difference. Management capacity correlates to that human element; who is managing the water system and how it is being managed. Researchers conclude that good management has an impact on a water system's ability to achieve and maintain compliance with regulations. The problem is that we don't yet have exact measures, or least as exact a set of measures as are found for technical and financial capacity. However, as capacity development programs are implemented, the body of knowledge regarding management capacity will grow and correlations between management capacity indicators and likelihood of compliance will solidify. Nevertheless, enough is known about water system management for states to have created criteria for measuring management capacity. For example, Pennsylvania's methodology for evaluating the business plans of small public drinking water systems employs numerous indicators of management capacity.[1]

Idaho's Measures of Technical, Financial and Management Capacity

The State of Idaho has developed measures of technical, financial and management capacity (TFM) for use in reviewing drinking water systems' applications for financing from the Drinking Water State Revolving Fund Program (DWSRF). Under the provisions of the SDWA Amendments of 1996—which created the DWSRF financing program—states must review the TFM capacity of fund applicants to determine if they will have the capacity to successful continue operations after financing is received. Systems seeking low interest capital financing from the DWSRF have an incentive to acquire and maintain sufficient TFM capacity. Idaho's TFM capacity criteria create a benchmark for all public water systems whether seeking DWSRF financing or not.

In determining if a system with adequate capacity can sustain those levels, most states—including Idaho—try to predict capability up to five years into the future.

How Water System Management Teams Can Make Use of Idaho's TFM Criteria

The State of Idaho has determined that water systems that meet the TFM criteria are excellent candidates for low interest financing. These systems have successfully demonstrated they have the essential traits of sustainable water systems. They have the technical capability to produce and serve safe drinking water (or will have after they borrow the money necessary for system improvements); the fiscal capacity, financial management and credit-worthiness to demonstrate financial capacity; and, the management system in place to ensure that their capabilities are in place and have the potential to improve over time.

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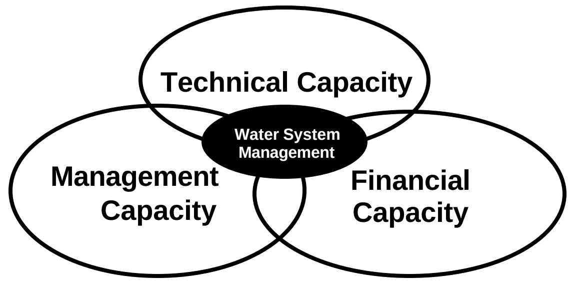
[1] *Evaluating Business Plans for Small Public Drinking Water Systems*; Apogee Research, Hagler Bailly, and Cadmus Group, Inc.

Water systems management teams can use these TFM criteria as benchmarks for their own systems. To measure their own capability, determine where and whether improvements should be made, and to incorporate those improvement needs (if any) into their annual business cycle. Each member of the team comes into their position of responsibility with a particular bias or biases to one or more of the TFM capacity areas. Ideally, team members will learn enough about each capacity area to be able to contribute to the decision making process that moves the water system toward fulfilling its mission.

The following sections provide an overview of Idaho's TFM Capacity Criteria and offer ideas on how water system TFM capacity can be measured and improved.

Water System TFM Capacity

The Interaction of Technical, Financial and Management Capacity



TECHNICAL CAPACITY

Technical capacity is the technical or physical infrastructure of the water system, including, but not limited to, the adequacy of the source water, infrastructure (source, treatment, storage, and distribution) and the ability of system personnel to implement the requisite technical knowledge. Every public water system has unique physical characteristics. Those characteristics help determine the type and level of operations, maintenance, water testing, regulatory oversight and other actions necessary to ensure that safe drinking water is produced and transmitted to the public.

Sanitary Survey and System Drawings

One way to quickly review the physical and technical characteristics of the water system is to examine the most recent sanitary survey document, which should be on file as part of the water system's records. A copy of the sanitary survey should also be available from the Department of Environmental Quality. Sanitary surveys are usually conducted once every five years. Since nearly every water system has been constructed according to regulatory standards, the sanitary survey helps to indicate where the system stands compared to specific regulatory standards related to its unique character.

Another source of information about the water system is the collection of engineering drawings that provide a visual layout of the physical infrastructure. Engineering plans, as well as "as built" drawing—depicting the actual facilities constructed from those plans—can assist new members of the management team in understanding the scope of infrastructure assets that require attention.

Technical Capacity Criteria

When a water system's technical capacity is reviewed, an assessment is made about the current and future condition of the physical components of the drinking water system and its water sources. The State of Idaho's technical capacity criteria[2] address the following water system components:

- Water treatment facilities
- Water sources
- Water source capacity
- Water storage, pumping and distribution capacities
- Water distribution system integrity

In asking the questions in the assessment protocol, the discovery of a deficiency in any of the key component areas mentioned above is enough to further examine the situation and to determine whether capital financing will overcome the deficiency. Thus, some assessment questions, or sub-components of individual questions, may lead to a need for further clarification. When this occurs, there may be an opportunity for more information to be provided that clarifies the technical capacity to comply with the Idaho Rules for Public Drinking Water Systems. For the purpose of DWSRF funding, the technical capacity assessments are conducted by DEQ staff engineers.

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[2]*Idaho DEQ Water System Capacity Assessment Indicators: Managerial, Financial and Technical Capacity Assessment Indicators for DWSRF Loans*.

1. Water Treatment Facilities

Here, an analysis is made of the ground water or surface water treatment facilities. Do the necessary facilities exist to meet the requirements of the Idaho Rules for Public Drinking Water Systems? Are those treatment facilities functional? Are the facilities expected to meet the applicable regulations and rules for the next five years?

2. Existing Water Sources

Are existing water sources developed and protected according to the requirements of the Idaho Rules for Public Drinking Water Systems? The water management team has responsibility to protect and conserve water resources. A means to protect resources is through source water protection, which helps to guard public health by protecting drinking water supplies. A source water protection program is a systematic approach to identifying water sources and land that needs to be protected, identifying actual or potential causes of contamination, and putting a plan in place to manage those contamination threats.

To help achieve source water protection, the SDWA Amendments of 1996 require every state to establish a Source Water Assessment Program (SWAP). The program's purpose is to evaluate existing and potential threats to the drinking water quality of the state's public water systems. These assessments identify your system's source water protection area, the contaminants in the area, and the susceptibility of the water supply to contamination. It is a good resource and contains useful information for putting your source water protection program in place.

3. Water Source Capacity

Whether the water system uses surface water or ground water (or both), having the capacity to meet current normal and peak customer demands is essential. Adequate source capacity usually means that the system does not suffer from inadequate water pressure or flow. Minimum water pressure and flow characteristics are established by the Idaho Rules for Public Drinking Water Systems. Also, is water source capacity expected to be adequate in the near future (next five years)?

4. Water Storage, Pumping & Distribution Facilities

Does your water system have adequate water storage, pumping and distribution capacity to meet current normal and peak customer demands as required by the Idaho Rules for Public Drinking Water Systems? This criterion seeks to answer the question of whether your water system can produce, store, pump and distribute the necessary minimum amount of drinking water to your customers. Once again, consideration of the future ability of these system components to meet customer demand is important.

5. Existing Water Storage Facilities

While the previous criterion examined the capacity of the water storage facility (or facilities), this capacity measure addresses the specific characteristics of the facilities regarding structural integrity. Do the water storage facilities currently (and in the near term) meet the requirements of the Idaho Rules for Public Drinking Water Systems?

6. Water Distribution Line Leak Repair

Water management teams should know the general condition of their distribution system. Certainly, a team that knows the extent of the distribution system, as well as its composition and remaining useful life, will be in an excellent position to determine future reinvestment in that system. This capacity criterion examines one symptom of a distribution system in need of repair—the number of distribution system leaks per one hundred connections per fiscal year. The threshold for adequate capacity is less than four distribution system leaks per one hundred connections per fiscal year.

7. "As Built" Drawings

Does the system have current copies of "as built" engineering drawings of system facilities? "As built" drawings describe the existing water system as it has been built—an improvement over design drawings that are produced prior to system construction. In part, this measure of capacity is a check on management capacity as well, because it is a validation of the water system management team having the information it needs to effectively oversee the facilities.

8. Water System Violations

One measure of water system technical capacity is the number of regulatory violations (of the Idaho Rules for Public Drinking Water Systems) that have occurred in the last twelve months. Here the water system management team will need to know how many of those violations (if any) occurred because of probable technical defects of the water system and its components. Violations of MCLs usually indicate a failure or problem with the water system facilities or a problem with operations and maintenance of the system. Other violations—such as those relative to a failure to monitor, for example—may be an indicator of management problems.

Improving Technical Capacity

The water system management team is the key to improving technical capacity. Once existing technical capacity is determined, the management team can take three specific actions to ensure that the water system facilities have the capability to produce and distribute safe drinking water. If producing safe drinking water consistently is still a goal, these three actions will help the system approach compliance with drinking water regulations. These interrelated actions are: facilities maintenance and repair, asset assessment and management and capital facilities planning.

Facilities Maintenance and Repair: The professional staff of the water system can have an important impact on the condition of the physical components of the water system. Implementation of facility maintenance plans and schedules for the variety of accessible system components helps to assure that they will be in good working order. Obviously, some buried components, will be difficult to maintain. However, for components that are more easily accessible, ongoing attention by the professional staff may prevent problems that detract from meeting technical capacity standards.

Asset Assessment and Management: Do you know what you own, what its current condition is and what the remaining useful life is of the various physical assets of the water system? An asset management program can help the management team answer these questions and provide information for decision making. The asset assessment and management process further informs the management about the quality of the physical facilities and the threats that weakened facilities might have on maintaining technical capability over time. Such a process includes the following steps:

- Identifying the physical assets of the water system.
- Determining the age and condition of those assets.
- Determining the remaining useful life of those assets.
- Determining a schedule of asset management or replacement.
- Calculating the costs of maintenance and/or replacement of assets in current and future years.

Water system management teams seeking to inventory their facilities and determine the financial impacts of asset replacement can utilize software tools such as CAPFinanace™

to accomplish these tasks. For more information and to review the CAPFinance™ software user manual see http://sspa.boisestate.edu/efc/Tools&Services/CAPFinance.htm.

Capital Facilities Planning: Once the management team has good information about their asset inventory, a multi-year plan for addressing the needs for facilities improvement can be designed. A capital facilities plan includes decisions to take action to repair, maintain, replace and expand the inventory of water system components. Every year, the capital facility plan action-items become part of the planning function of the annual business cycle, and are translated into budgetary priorities.

FINANCIAL CAPACITY

Financial capacity means that the water system possesses the financial resources needed to comply with drinking water requirements for both the short and long-term.

Overall financial capacity for a water system can be assessed by examining both the fiscal condition (and factors that affect fiscal condition) and the financial management of the system. The former describes the ability of the water system to raise the resources necessary for proper operation; the latter assessment is of the management of those fiscal resources.

Measuring Financial Capacity: Fiscal Capacity and Financial Management

Ideally, an examination of financial capacity should be made based upon verifiable financial reports and other information produced based upon standard accounting principles. The following questions help to reveal the water system's fiscal capacity:

- How do total user charge revenues match up against total system expenses?
- Are other revenue sources necessary? If so, what are they?
- Are customer user charges affordable?
- Does the water system ensure its cash flow with a cash budget?
- How often does the water system review and adjust its user rate system?

Answering questions related to financial management can assess the management of those fiscal resources. For the purpose of determining whether the State of Idaho could confidently loan its funds to the system, the questions are designed to address the critical issue of whether or not a public water system has financial management controls that enhance its ability to return DWSRF principal and interest payments. The following questions are important even if a system is not seeking financial assistance form the state:

- Does this water system produce and utilize an annual budget?
- Does the water system produce and utilize a capital budget?
- Does this water system produce and utilize a capital improvements plan?
- Are periodic financial audits produced for this system?
- Does this system have a current bond rating?

Financial Controls

Another indicator of good financial capacity is the establishment and adherence to a system of financial controls. They help to protect the financial resources of the water system from mismanagement. Financial controls are related to and implemented by the organization's accounting and financial reporting practices. Periodic audits of the system's financial performance will reveal any weaknesses in financial controls.

Financial controls reflect generally accepted accounting principles and should be reviewed by the system's independent accountant or auditor. Financial controls vary somewhat by the magnitude of the water system, but generally include the following:

- Guidelines for the process of receiving money.

Financial Controls

- Procedures for the disbursement of financial resources.
- Identification of personnel authorized to receive or disburse monies.
- Signature authority for deposits and credits to system accounts.
- How financial transactions are recorded.
- Prescribed content and format of the system's chart of accounts and periodic reporting mechanisms.

Fiscal Capacity Indicators

1. Do water system revenues from user charges meet or exceed expenses?

For water systems operating in a business-like manner, the amount of money raised for the sale of goods (safe drinking water) should cover the costs of producing those goods. While user charges are not the only source of revenue, for most systems the majority of revenues come from user charges. Financially viable systems set rates to cover the expenses incurred in delivering the service. It is important that the rates reflect all relevant expenses and reflect a full cost accounting of the systems operations

Other indicators help explain the significance of user charge revenues. The **operating ratio** measures the amount of operating revenue versus the total amount of operating expenses for a utility system. An operating ratio that indicates that expenses are less than revenues is a positive indicator of financial condition. An examination of **retained earnings** over time helps to explain whether revenues have comfortably exceeded expenses.

2. If the total revenues from user charges minus the total water system expenses are less than zero (0), are other funds contributing to water system operations to offset system expenses?

If user charges cannot meet water system expenses, it is important to know what the other sources of revenue are and whether they are dependable. For example, if a water system's revenue base has significant contributions from hookup charges relative to system expansion, can the system depend upon those revenues in the future? Significant non-rate revenues (revenues other than user charges) may signal revenue stability problems for the future.

3. Is the current affordability index, using existing water rates, within the affordability criteria?

The current affordability index measures the burden of costs passed from the drinking water system to the users against the median household income for the area. A typical "affordability" range utilized by many states to assess the burden of water costs on residents is from 1.25 to 1.75% of median household income. A cost greater than 2.0% of median household income should be investigated further—especially if the residents are paying additional user charges for wastewater, solid waste and other utility services.

One way to further evaluate the affordability of existing water rates is to examine the City's accounts receivable data. While this comparison does not directly relate to affordability, a relatively low receivables percentage does indicate that customers are paying their bills in a timely manner. A standard for utilities is a receivable to sales ratio at or less than 10%.

4. Is the future affordability index using future water rates within the affordability criteria?

This measure considers the affordability of user charges when incorporating increases in expenditures and/or the additional debt of capital projects into the future rate structure. This question uses the same criterion as the current affordability test.

5. Does the water system include a cash budget within its annual budget for cash flow and emergency purposes?

A water system that incorporates a cash budget equivalent to one and one-half the monthly operational expenses is conscious of the need to be prepared for emergencies, payment delinquencies and other short-term cash flow problems. The cash budget goal of one and one-half the monthly operational expenses is related to the fact that many small water systems may not be able to quickly assemble their board of directors to deal with cash-flow problems. Until the governing board can be convened, the costs of operation would be covered.

Given potential uncertainties, another indicator used to describe the ability of the water fund to meet short-term obligations from available business-cycle resources is the **working capital** calculation. This is computed by subtracting current liabilities from current assets. The greater the difference (net positive), the more the water system will be able to weather short-term operational financing challenges such as unexpected increases in expenses or income, and other short-term emergencies.

6. Does the water system management review the user fee, user charge or rate system at least once every two years?

It is good practice for a water system to review its rates on a regular basis. The longer the interval between water system rate reviews, the less likely the system will be able to adjust to significant changes in expenses. The longer the interval between user charge reviews, the less likely the system will be able to raise user charges to meet expenses related to new or amended drinking water rules. In addition, this indicator of fiscal capacity asks about the guidance or techniques the management team uses to design their user charge system.

Financial Management Indicators

1. Does this water system produce and utilize an annual budget?

Effective operation of a water system requires utilization of an annual budget. A system's budget should forecast planned revenues and expenditures for the coming year based on anticipated activities. The budget is then utilized to control ongoing activities and evaluate performance of the system.

2. Does the water system produce and utilize a capital budget?

The use of a five-year capital budget is a positive indicator of financial management and supports the assessment of technical capacity conditions. A capital budget is an indication that the water system is cognizant of the need for financing infrastructure upgrade and/or replacement

3. Does this water system produce and utilize a capital improvements plan?

The use of a capital improvement plan is a positive indicator of financial management and supports the assessment of technical capacity conditions. A capital improvement plan is an indication that the water system is cognizant of the need for planning infrastructure upgrade and/or replacement, growth and other factors that might require financing.

4. Are periodic financial audits produced for this system?

An independent audit provides expert testimony to the internal controls, integrity of the financial statements and adherence to generally accepted accounting standards of a system. Idaho Code, Section 67-450B, does require a financial audit *for government entities* with budgeted revenue over $50,000.

Periodic financial audits produce verifiable information that can be easily examined by the water system management team, as well as financial assistance providers and regulatory agencies. In terms of the annual business cycle, periodic financial audits contribute valuable information for analysis purposes.

What the Audit Does

- Provides independent verification of the system's financial condition and operating results for a specified period.
- Reviews internal controls to identify problems that could result in "material misstatements" in the financial statements.
- Reports financial information in a standard format that can be used for comparison with similar organizations.

What the Audit Doesn't Do

- The audit is not designed to detect fraud; rather the auditor will report unusual and suspicious information. If fraud is suspected, then the water system board can call for a special audit.
- The audit does not evaluate financial condition or operating results of the water system. The water system board and officers evaluate condition and results using the verified information prepared by the auditor.
- The audit does not claim to present the financial information accurately in all respects.

5. Does this system have a current bond rating?

When issuing debt to secure capital financing, some public water systems will seek a bond rating. Corporate and governmental bond issues may have ratings assigned to them by rating agencies such as Moody's, Standard & Poors, or Fitch. The bond rating speaks to the investment quality of the debt issue. It is not unusual for small water systems not to have a corporate bond rating. When a bond rating is not available for an applicant to the DWSRF, this indicator is excluded from the financial analysis. Instead, a more detailed examination of audited financial reports may be in order.

Improving Financial Capacity

If a water system has adequate fiscal capacity, that is, the ability to raise enough revenues to meet expenses for the current year and future years, then the greatest gains in financial capacity will come from the water system management team's use of financial information. Going back to the annual business cycle; when the short and long term plans have been sufficiently financed through the budget process, and, when the financial transactions (reflecting budget implementation) are recorded, reported and analyzed; then the water system's goals will be achieved.

How does the managemnt team confirm that it is on the right track? Ratio8™—developed by the Environmental Finance Center—is an example of computer models that have been developed to simplify the tasks of tracking financial capacity. Other organizations such as, the Idaho Rural Water Association and the Rural Community

Asssitance Corporation can offer technical assistance designed to improve financial capacity.

What is Ratio 8?

Ratio 8 is a simple financial assessment tool to help you analyze your water system's financial condition. Using eight ratio formulas, Ratio 8 helps you assess the true costs of financing your public water system, as well as look for trends and find ways to make improvements.

To deliver safe water, your water utility needs to have a secure water fund to assure that system goals can be met. This guidebook and spreadsheet program are designed to help the management team:

- Better understand the water utility's financial condition;
- Analyze information about the true costs of financing the water system; and,
- Develop integrated information for making long-range decisions.

What does Ratio 8 do?

Ratio 8 is an easy-to-use, financial assessment tool, designed to compliment any accounting and reporting system. Transforming traditional approaches of measuring creditworthiness, Ratio 8 focuses on the following financial areas: Operations, Revenue, Liability, Sales, Expense, Assets, Debt, and Accounts Receivable.

The model uses eight financial ratios in Ratio 8 to create financial indicators providing insight about the water system's debt burden, financial operations, socioeconomic conditions, and user fees. In addition to calculating financial ratios, Ratio 8 creates a trend analysis graph for each of the ratios, based on three, five or ten years of data. Trend analysis allows comparison for positive and negative trends, identifying strengths and weaknesses of the water system's utility's financial condition.

Ratio 8 helps managers and board members manage better by improving information. Finding time to consider the long-term financial outlook of a water system poses a challenge. That's why Ratio 8 offers a short cut to getting financial information that leaders need to make good decisions. Ratio 8 uses simple ratio calculations and a trend analysis tool to help pinpoint potential problems and monitor the financial condition of the water fund.

Ratio8 can be examined at http://sspa.boisestate.edu/efc/Tools&Services/Ratio_8.htm.

Financial Statement Analysis

A water system's financial position can be compared with the industry averages reported in the 2000 Robert Morris Associates (RMA) Annual Statement Studies based on sales. RMA data is one set of benchmarks that a water system may use for comparison purposes. An example of a comparison of benchmark data and information from a water system balance sheet is shown in the accompanying table.

Example: Gem Creek HOA Water System Balance Sheet – September 30, 2000

	Water Fund	Industry Averages*
Current Assets	19.89%	16.7%
Restricted Assets	4.8%	9.7%
Fixed Assets	71.0%	73.6%
Total Assets	100%	100%
Current Liabilities	7.6%	12.9%
Non-Current Liabilities	32.3%	46.7%
Fund Equity	38.7%	40.3%
Total Liabilities & Fund Equity	100%	100%
Operating Revenue	100%	100%
Operating Expenses	76.3%	75.7%

**2000 Robert Morris Associates Annual Statement Studies: Utilities – Water Supply SIC#4941*

Current Data Sorted by Sales [0-1MM] Note: According to the RMA web page, The Risk Management Association—formerly known as Robert Morris Associates—"is the leading association of lending, credit, and risk management professionals serving the financial services industry." (www.rmahq.org).

Financial Ratio Calculations

To further explain financial condition water system, financial information can be analyzed using a series of common financial ratios. Financial capacity may be improved based upon the management team's interpretation and use of information derived from financial ratios. By monitoring key ratios over time, and charting the direction of the movement in ratio values (either positive or negative), the management team can correlate ratio information to the overall performance of the water system. Examples of common financial ratios are:

- Current Ratio. The Current Ratio indicates the number of times assets will pay off liabilities.
- Sales/Receivable Ratio. This ratio measures the number of times receivables turnover during the year.
- Sales/Net Fixed Assets Ratio. This ratio measures the productive use of an entity's fixed assets.

  The sales to net fixed asset ratio provides important information on the relationship of sales volume to assets. Due to the relatively fixed customer base of a water utility, the ratio says more about the investment in fixed assets of the system than the ability of management to maximize sales volume. A low ratio would indicate excessive investment and non-productivity of the asset pool while a higher ratio may indicate under investment on the part of the utility.
- Debt/Worth Ratio. The debt to worth ratio measures the capital contributed by creditors to the equity of the fund.

A lower ratio indicates more financial security for the entity. The city's ratio will shift upward as it incurs additional debt. However, if the system funds depreciation or replacement the ratio will improve over time.

MANAGEMENT CAPACITY

Management capacity means that the water system has the institutional and administrative resources needed to comply with drinking regulations. The general management capacity of the water system can be examined to assess staff and board capabilities and whether these human resources have created an organization that supports proper financial management and technical operations (or system management). A quality operation is an outcome of good management. When service is poor, the customers will assume correctly that this equates to poor management. It is important that all aspects of the water system, including management, provide the highest quality service to the public.

Measuring Management Capacity

Management capacity correlates to the human element; who is managing the water system and how it is being managed. Researchers conclude that good management has an impact on a water system's ability to achieve and maintain compliance with regulations. Enough is known about water system management for states to have created criteria for measuring management capacity.

The result of management capacity is the demonstration that the water system can operate in a trouble-free manner while providing affordable drinking water to its customers. In addition to this results-oriented demonstration, there are a number of indicators of management capacity that water system management teams should consider. The general agreement among regulatory agencies and capacity development professionals is this: Water systems that meet the criteria for management capacity are more likely to comply with drinking water standards over time.

Indicators of management capacity continue to evolve. The state Idaho's DWSRF program uses six broad indicators of management capacity. Evidence of meeting these minimum standards of capacity is demonstrated through the submission of various documentation as described in this section. These indicators examine the following areas:

1. Staff Capability for Effectively Operating the Water System

Usually the largest expense in a water system budget is personnel. It is important then that the professional staff of the water system is capable of producing safe drinking water on a consistent basis and can operate the system so that compliance with Idaho Drinking Water Rules is achieved and sustained. A system with an inadequate staff (in terms of staffing levels and qualifications) is more likely to face compliance challenges in the future. This is because of the increasing the complexity of drinking water regulation; the task will never be simpler than it is today.

Does management retain and compensate personnel whose training and expertise is appropriate to the needs of the system? Do the persons responsible for operating the water system have the correct certification or licensure assurances for the system in its current configuration? Will they be qualified to operate the facilities if and when they are upgraded? Under the DWSRF requirements, water systems provide the names and certification levels of their existing staff. The qualifications are then checked against the certification requirements of the existing and potential system configurations.

Staffing Strategy. Water system management teams can ensure that proper staff capacity exists by developing a staffing strategy. In the strategy, all existing and future staff positions can be depicted in an organization chart. The chart helps to define lines of authority and communication channels.

An assessment of the various personnel activities relative to operations, maintenance and administration will help the management team understand whether additional positions in the organization chart are needed or if current positions need to be reconfigured to meet changing operational requirements. This assessment may necessitate the upgrading of job descriptions for the current positions.

A staffing strategy not only helps the management team meet the challenges of changing personnel requirements, but it can provide important information for the planning and budgeting functions of the annual business cycle relative to implementing the strategy.

Hiring Contractual Operators For Public Drinking Water Systems

Management teams may opt to hire outside contractual operating services to comply with their operator certification requirements. Contract operations have the potential to increase management capacity while avoiding the high costs of adding full-time staff or struggling to retain qualified personnel.

Irrespective of whether your system hires a contract operator or not, the owner of the water system has ultimate responsibility for complying with all aspects of the drinking water rules and to ensure that your water system receives proper operation and maintenance, and distributes safe drinking water. The following DEQ guidelines are useful to consider if the staffing strategy includes the possibility for contracting for operator services.

It is recommended that the following information should be obtained and discussed when interviewing potential contract operator candidates:

1. ***Does the candidate possess the required level and certificate of competency?*** The contractual operator must possess the required level of certification for your particular class water system and should have experience operating similar types of treatment processes. The candidate should provide you with a photocopy of their current certificate. Each operator's certificate must be renewed by March 1 each year to remain valid. If you have questions regarding the level of certification required for your particular water system or whether a certificate is current or expired, please contact the Certification Board office at 208-746-3479.

2. ***Does the candidate have experience operating your type and size of water system (treatment components) and distribution system?*** It is possible that an operator will possess the correct certification level and not possess experience compatible with your type of water system. For instance, a Class II operator may be experienced with ground water systems but not surface water systems or vise versa.

3. ***How many years of operating experience does the candidate possess?***

4. ***Does the candidate have references?*** Ask for and verify all references.

5. ***Can the candidate perform minor repairs, required operational testing and basic system troubleshooting?*** Is the candidate willing to perform this work as part of the contractual agreement? It is desirable for the contract operator to be capable of performing operational testing and routine mechanical and electrical maintenance. This may provide cost savings versus hiring additional commercial services for testing and maintenance. However, commercial services and/or consulting engineering services may be required for more complex maintenance or operating problems.

6. ***Does the candidate carry adequate contractors' liability insurance?*** This helps protect the owner from potential suits in case the contractor or a contractor's employee is injured. It also provides protection in the event of contractor damage to the owner's equipment.

7. ***Is the contract operator willing to turn over all water system records to the owner of the water system at the time of contract termination?***

8. ***What are the minimum duties (both required and expected duties) to be completed by the candidate?*** A list of the duties that, at a minimum, must be completed and the frequency each duty must be performed should be included in the contract. Duties that are not required, but may be needed or expected to be done to carry out required duties, are typically system specific and could include weed and trash removal to maintain access to a well house, storage tank, or surface water system intake, vector control in a well house to prevent destruction of electrical wiring or insulation of pressure tanks, etc. and so forth. A sample list of duties is provided in the table below. The sample list may be modified, as necessary, to meet the specific operational needs of your water system.

If You Decide Contract Hiring Is Right For You

Once you've made the decision to contract and found a candidate that seems to be a good fit for your public water system, you're ready to address additional details such as the contract duration, compensation, operator time and responsibilities and owner responsibilities. It is recommended that the following aspects of each contract related item be considered and addressed as appropriate for your specific public water system.

Contract Duration. The contract duration should include the effective starting date and effective termination date. The contract should have an agreement of termination (by either party) by advance, written notice of a specified number of days.

Compensation. Compensation covers items such as wages, health benefits, workman's compensation, vacation, sick time, disability, holiday time and paid paternity or maternity leave.

Operator Time. The owner and operator shall jointly designate the number of routine visits and the minimum number of hours spent per day, per week or per month at the water system. The owner and operator shall also jointly determine the maximum acceptable response time when responding to an emergency or to troubleshoot operational problems. The acceptable response time may vary depending on the treatment components and distribution system of the particular water system, closeness versus remoteness of system, and the nature and severity of the problem. In no instance, should the response time for an emergency or problem that could result in public health impacts be longer than (2 hrs, 30 minutes, ½ day, 12 hours? Designate a specific time appropriate for your system).

Operator Responsibility. As the designated responsible-in-charge operator, the contractual operator is responsible for maintaining a valid certificate that is equal to or greater than the classification of the particular public water system and/or distribution system being served. The contractual operator should annually send a photocopy of their renewed operator's certificate to the owner of the public water system. The contract operator is also responsible for providing a certified backup operator during those times when the system is in operation and he/she is not available or is inaccessible.

Owner Responsibility. All responsibility retained by the owner must be clearly documented in the contract. It is the responsibility of the owner to notify the operator of any emergencies and/or operational problems for which the operator is responsible that arise in the operator's absence. The owner and contract operator shall jointly determine a maximum response time within which the owner will notify the contract operator after the owner or a water system user experiences or recognizes an operational problem or emergency. The owner is responsible for having telephone numbers; pager numbers or other relevant means of communication for both the designated responsible-in-charge and backup contract operators. The owner may choose to post contact numbers for the contract operator in a visible location for the water system users. The contract operator will provide a list of routine operational checks to be made by the water system owner.

2. System Governance And Oversight

This capacity indicator asks the basic question: "Who's in charge?" What is the governance structure of the water system? Does this water system have a governing board or board of directors?

The governance system of a public water system may vary according to the type of system. Municipal water systems are usually governed by the city council or by a water system advisory board. Other publicly owned water systems, such as water districts, have similar board or council-type governing bodies. Privately owned systems may use a similar board of directors governing structure. Homeowner association water systems may also utilize boards of directors.

Some public water systems that are privately owned and considered "not-for-profit" operations may employ a sole-proprietor or partnership governing model. Other variations of governing structure certainly exist.

Regardless of governing structure used, this capacity indicator addresses the issue of who is ultimately responsible for the operation and oversight of the water system. It is also important to know what the level of water industry experience is for each of the governing officers. Management capacity is enhanced when governing board members have participated in water system training courses, and other operational and management capacity-building events. Board members with significant years of experience may also have a good perspective regarding the water system's ability to keep up with changes in industry standards and regulations.

Idaho DWSRF loan applicants are requested to describe the structure of governance, a list of current governing officers, and the years of experience for each officer listed.

3. Formal Communication

Is there a formal communication linkage between the water system operator and one or more members of the governing board or board of directors? Formal communication puts in place a process to allow the governing board to be fully informed and in control of the water system decisions. Management capacity is enhanced when formal communication channels are created between governing board members (usually part time officers) and full time professional operations staff. For example, city councils may require their key operations staff to attend their monthly council meetings to report on water system activities, or a council may designate one of its members as the liaison or "point person" for water system issues.

4. System Policies

As was discussed in the first section of this Handbook, good management will increase the ability of the system to achieve its mission, as well as reduce liability exposure. System policies help create the frames of reference necessary for the professional staff to determine the scope of authority granted by the governing board. Management teams that create written guidance documents also provide a measure of continuity and guidance for water system personnel. Good business practice demands that the policies listed below should be in written form, adopted and periodically reviewed by the water system management team.

What is most important is that the written policy exists, that the content is appropriate for the size of the water system, and that the management team is committed to reviewing and updating the policy periodically. For example, although the City of Eden could adopt the format of the City of Boise's personnel policy, a better fit would be a simpler document that covers key issues of personnel management and policy suited to smaller communities. The content of the policies is more important than the structure.

The DWSRF loan application requirements identify the following six policies as indicators of management capacity. A general description of each type is also offered here:

- **System Operations Manual or Policy**

  This policy provides technical guidance on how the water system is operated. This manual or policy is likely to be the most detailed guidance document of the six listed here. Operations policies also include guidance for monitoring and reporting of water samples and testing results.

- **Board Governance Policy**

  The board governance policy reflects the protocols for the governing board's activities. This policy includes qualifications for election of board members, the number of members who may serve and their terms of office, rules regarding the conduct of meetings, etc. Establishing board protocols can improve the efficiency of board meetings and result in effective use of officers' time.

- **Personnel Policy**

  The personnel policy would include guidance regarding hiring, probation, dismissal and disciplinary procedures; provide detail on employee compensation and fringe benefits; establish requirements for conduct and performance; describe job descriptions and expectations, and explain procedures for employee evaluation.

- **Safety and/or Risk Management Policy**

  Accidents, experienced by both the water system staff and the customers they serve, can cause significant disruptions of water service as well as create unexpected financial liabilities. A safety and risk management policy attempts to confine the scope of authority of employees and managers in order to reduce the risk of such negative financial exposure. A water system's insurance provider can offer assistance in establishing risk management guidelines to limit liability.

- **Operating Emergency Plan**

  Every public water system needs to know how it will react to natural disasters and other emergencies. Specifically, the water system management team needs to know what steps are to be taken and what actions are to be accomplished given a variety of threats to service delivery. Since the events of September 11, 2001, threat readiness and response is absolutely necessary to commit to written policy, especially in the face of terrorist threat to essential facilities such as public drinking water systems.

- **Customer Service Policy**

  A water system is in the business of providing service—safe drinking water—to its customers. A customer service policy strengthens the relationship between the water system and its customers because it clarifies how the water system will relate to those it serves. This policy should include public information guidance, complaint resolution procedures, problem response requirements, billing and other notification rules, and other actions the system can take to assure the customers that the water system is being run in the most professional manner possible.

Organizations exist to help provide guidance on the content of each of these policy documents. Water systems with limited staff capacity to create these policies can utilize and modify model policies in each category. Organizations such as the Rural Community Assistance Corporation, the Idaho Rural Water Association and the American Water Works Association have excellent model policies. In addition, similar sized water systems may be good sources of sample policies.

5. Professional Support Regarding Engineering And Legal Services

Water system capacity in the areas of engineering and legal service (as well as other professional services such as accounting and auditing) is increasing essential to successful service delivery over time. While water systems can assure such capacity by hiring these professionals, most small systems can gain these capacities by retaining engineering and legal services by contract, or by hiring these professional services as necessary.

Legal and engineering services are specifically identified for capacity assessment purposes by the state of Idaho. Each profession provides to the water system the capacity to keep pace with regulatory requirements and to advise response to changes in these regulatory requirements.

6. Record Keeping

A final indicator of management capacity used by the State of Idaho is record keeping. Well-managed water systems are expected to have record keeping systems that can easily yield important records for review by the operations staff, the governing board members, customers (where appropriate), and regulatory agency staff of the DEQ and EPA. Record keeping systems create and preserve an important record of the water system's status and activities. For the purposes of DWSRF loan applications, an evaluation of the condition and content of the record keeping system is made by the DEQ.

For a water system seeking to demonstrate management capacity relative to record keeping, the following questions should be answered affirmatively:

- Does this water system have current "as built" engineering drawings of the system facilities?
- Does this water system effectively maintain system operating records for operator, board member, customer, EPA and DEQ reference?
- Does this water system effectively maintain records of correspondence with the Department of Environmental Quality and/or local Health District (and where appropriate, the Idaho Public Utilities Commission)?
- Does this water system effectively maintain records of correspondence with the United States Environmental Protection Agency?
- Does this water system effectively maintain records of the results from required water testing as well as Consumer Confidence Reports (CCR's)?

ADDITIONAL RESOURCES

For additional resources, please visit: http://sspa.boisestate.edu/efc/deqhandbook