Introduction to Financial Benchmarking Workbook

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INTRODUCTION TO FINANCIAL BENCHMARKING

A Workbook for the Managers of
Small Community Drinking Water Systems

Sponsored by

The Midwest Technology Assistance Center

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The Departments of Geography and Agribusiness Economics at Southern Illinois University provided the administrative support, faculty time release, office space, and computer equipment needed to complete this project.

In the spirit of true benchmarking, this curriculum combines examples of some of the best practices in financial benchmarking with many of the best publications and training tools, to create a short set of lessons to help small system managers to explore how benchmarking techniques can be used to improve the management of their drinking water system. We have tried to carefully list the sources of all of the materials used in the development of this workbook, and many of them appear in the *Resources for Financial Benchmarking* section at the end of this workbook. Whenever possible, the sources of the materials presented are identified in the text. However, considering the large number of materials that were used and reviewed in the preparation of this workshop it is likely that we may have not properly identified some of the materials that we have "shamelessly stolen" (one author's definition of benchmarking). We apologize to any authors or organization that may not have been properly acknowledged in this workbook.

In the future, hit-or-miss methods, selfish practices that pass on problems to others, and inefficiency that raises costs to consumers or taxpayers will become less and less tolerable. All the operations relating to water supply will have to be governed by economic principles that have brought success to other industries.

Water Pricing Theory and Practice in Illinois
Handy H.H. Afifi and V. Lewis Bassie
1969

Preface

The purpose of this workbook is to introduce the topic of benchmarking, to demonstrate how this approach can be applied to financial management of small drinking water systems, and to identify some of the many resources that managers can use to assess and improve their drinking water systems.

This workbook was designed as a companion document to the presentation of these materials in a half-day workshop. The workbook contains reproductions the majority the presentation slides prepared for the workshop. These reduce the need for note-taking and allow participants to focus on the information being presented and to engage in interactions with the presenters and other participants. The workbook can be used without attending a workshop, as a study guide to benchmarking topics and techniques.

A recent MTAC-funded research project *(Benchmark Investigation of Small Public Water System Economics*) was that small drinking water systems managers and decision makers are generally unfamiliar with financial assessment tools such as benchmarking. Therefore the goal of the benchmarking curriculum and this workbook are simply to *introduce* benchmarking. For those who are interested in learning more about benchmarking and financial management tools, we have included a selection of useful reference and self-help materials. The *Resources Guide for Small System Financial Management* appendix identifies easily available resources for further study and reference. These are materials that are not presented in detail in this workbook, but should prove in the assessment of the financial performance of drinking water systems, or many other water system or municipal activities.

Session One of the workbook reviews the characteristics of drinking water systems that have led to need for regulatory controls, and discusses how recent changes in regulatory approaches have resulted in the need for water system managers to learn more about performance measurement and assessment.

Session Two introduces *benchmarking*, a performance assessment and improvement technique that is widely used in the business community. This session presents many of

the key terms and concepts that are used in benchmarking, and the steps necessary to perform a benchmarking assessment.

Session Three of the workbook reviews examples of how benchmarking has been applied to drinking water system management, and describes some of the commonly recommended performance indicators that can be used in financial benchmarking.

Session Four presents a case study of how benchmarking might be used to assist decision makers in analyzing and addressing problems at one small system. Workbook readers can practice calculating performance indicators using a sample water system financial data (collected during the *Benchmark Investigation*, comparing performance measures, and suggesting alternative courses of action based on the results.

The authors of this curriculum would welcome feedback from workbook users. Please let us know if the information presented in this workbook helps you to improve the performance of your water system. We would welcome any ideas or suggestions that you may have for how we can improve the workbook or presentation slides on the accompanying CD-ROM. We would also welcome any "case studies" that you might have time to share about how benchmarking was to address the financial challenges facing your community water system. Contact information for the authors is provided on the front cover of this workbook.

Introduction

One of the dominant trends in modern business and public administration is the pursuit of continuous improvement through performance assessment and analysis.

In the private sector this trend has resulted in an explosion of techniques, trainings, books and web sites to assist businesses in their pursuit of excellence. One of the most effective tools that has evolved to meet the challenges of performance measurement and improvement is known as *benchmarking*. This performance improvement tool dates back more than 50 years, and can trace its roots to the Japanese practice of *dantotsu*", or "best-of-the-best" comparisons. Thousands of firms, in every conceivable sector of the economy, are currently engaged in benchmarking activities. Web sites operated by organizations such as the *American Productivity and Quality Center*, *Benchnet*, and *The Benchmarking Network*, provide benchmarking resources for every imaginable kind of business enterprise and business function.

A similar trend has evolved in the public sector and is best characterized by the passage of the *Government Performance and Results Act of 1993* (GPRA). The GPRA requires Federal agencies to systematically account for achieving program results. The *Act* requires agencies to:

- Set program goals
- Measure performance against those goals
- Report progress publicly
- Improve program effectiveness and accountability by promoting a new focus on results, service quality, and customer satisfaction
- Improve service delivery by planning for meeting program objectives and providing information about program results and service quality.

The National Partnership for Reinventing Government (originally the National Performance Review) is the interagency task force established to reform and streamline the way the federal agencies operate. The task force identified benchmarking as one of the key tools for agencies to use in their efforts to respond to GPRA, and prepared a report that provides guidance on how to implement benchmarking programs (NPR, 1997).

Benchmarking has also become firmly established in state, county and municipal administration. The June 1994 issue of *Governing* magazine describes the emerging benchmarking craze: "Governments that used to pay no attention to their own performance now seem obsessed with trying to measure everything in sight."

Numerous publications such as David Ammons, *Municipal Benchmarks*, Coplin and Dwyers' *Does Your Government Measure Up*? and the International City/County Management Association's *Small Communities: Collected Best Practices* provide basic guidance on performance assessment and present comparative measures for a wide range

of municipal functions, including: building code enforcement, government finance, parks and recreation services, police services, and public utilities. A number of web sites have also recently been developed to provide public officials with comparative performance measures and selected municipal data, such as ICMA's *Center for Performance Measurement* and Syracuse University's *Community Benchmark Program*.

Benchmarking can be particularly valuable to the managers of drinking water systems and many water resources agencies and technical assistance organizations have established benchmarking programs. The World Bank has developed a "Start-Up Kit" that water and wastewater utilities can use to collect key operational and financial performance measures. These data are then collected and reported on the World Bank web site. The American Water Works Association's (AWWA) *Qualserv* program employs benchmarking as a standard tool in its peer-review assessment process of water systems operation and management, and operates a *Benchmarking Clearinghouse* for water utilities. The AWWA Research Foundation sponsored the development of a detailed manual, *Performance Benchmarking for Water Utilities*, to guide water system managers through the benchmarking process. The State of Pennsylvania's Department of Environmental Protection chose benchmarking as its principal tool to guide small drinking water system business planning, and commissioned the *Development of Benchmark Measures for Viability Assessment* report. The Midwest Technology Assistance Center funded a research project to study the potential application and adoption of benchmarking practices by small drinking water system managers in ten Midwestern states (*Benchmark Investigation of Small of Small Public Water System Economics*). The results of this study are reported throughout this workbook and the examples and data used for exercises all come from the participants who took part in the *Benchmark Investigation*.

The AWWA Qualserv Program calls benchmarking "one of the most efficient tools available today to improve the performance of an organization". Benchmarking is clearly a management technique that is here to stay.

This Workbook was prepared to as one way to help put small community water system on the path of continuous improvement, by learning about benchmarking and how to use it to examine and improve the financial performance of your system.

Notes:

The text of the *Government Performance and Results Act of 1993* can be read on the web site of the ***OMB Watch***: *http://www.ombwatch.org/article/articleview/405/1/90*

The June 1997 National Performance Review report, *Serving the American Public: Best Practices in Performance Measurement. Benchmarking Study Report,* can be found at: *http://www.orau.gov/pbm/links/npr2.html*

The quote from Governing Magazine appears in the article, *An Overview of Performance Measurement,* by Richard Fischer, in **Public Management**, September 1994.

Session 1

Why Do Small Systems Need to Measure Performance?

Small Systems, Regulation, Capacity Development, Performance Improvement, and Financial Benchmarking

The purpose of this session is to provide a foundation to support the adoption of benchmark practices by small system managers.

This session will describe WHY it is more important than ever that water system managers develop and use performance assessment and improvement programs.

This session:

- reviews some of the key characteristics of drinking water systems, especially small systems
- describes how these characteristics lead to the regulation of drinking water systems
- discusses how regulations impose costs on water systems
- traces the evolution of regulatory approaches
- summarizes provisions of the newest drinking water regulations that require systems to become self-sustaining businesses
- explains how assessment techniques such as benchmarking can be used to analyze and continually improve performance

Session Goal

To review the characteristics of small water systems, business management practices, and drinking water regulations that have led to need for performance assessment by small drinking water systems.

The goal of this session is to reinforce the importance of adopting or improving the performance assessment methods used at your water systems.

The background information presented in this session should be useful to water system managers as they work with the members of their community to involve them in performance assessment efforts.

Water is perhaps the most essential element for life.

It is a daily requirement for human beings and most other species on the planet.

In order to obtain water of sufficient quality and quantity to meet their needs individuals can either seek to devise their own water systems, or join together with other members of their communities to develop communal water supplies.

As American cities grew and became more and more congested, individual water systems became a less reasonable option. Communal water systems soon developed in all of the nation's major cities.

Water Supply Characteristics

- Requirement for life
- Supply Alternatives
  - individual
  - communal/public
- Public water supply
  - "natural" monopoly
  - "public good"

Almost of these communal systems began as private enterprises, but public dissatisfaction with the quality of water services led to the call for local government control. Municipally-operated systems soon became the norm, in the United States, where more than 80% of the population continues to be served by publicly-owned water systems.

While the operation of drinking water systems shares many of the attributes of private sector enterprises, it also has several distinctive characteristics that invariably result in some form of regulatory control or other form of public intervention.

Two of the important characteristics of water supply enterprises that lead to regulation are its "natural monopoly" and "public goods" aspects.

"Natural Monopoly" Characteristics

PWS are considered to be "natural" monopolies

1) Very high fixed costs

2) Declining unit costs across range of demand (*economies of size)*

3) Single provider franchise

Market-based economies rely upon the competition between the providers of goods and services to deliver commodities to consumer in the most efficient manner. In the event that a single provider is producing a good that has no close substitutes, that provider is said to have a *monopoly*. Such enterprises rarely exist in isolation for long, because the profits earned by the monopolist provide an incentive for others to try and find ways to capture parts of the market.

However, one specific sub-category of enterprises, natural monopolies, have unique characteristics that typically earn them a protected place in market economies. *Natural monopolies* are those enterprises in which the most efficient way of organizing production to deliver goods or services to consumers is through a single firm. Characteristics of natural monopolies include:

- high "fixed" or start-up costs (i.e., reservoirs, treatment facilities)
- declining unit costs across the entire range of feasible demand
- single provider franchise

Public drinking water utilities have *all* of the characteristics of natural monopolies. The establishment of a drinking water supply generally includes the development of costly supply sources, treatment facilities, transmission and distribution systems, and record keeping and billing systems. These high start-up costs make it almost impossible for competitors to enter any water service area that already has an established supplier.

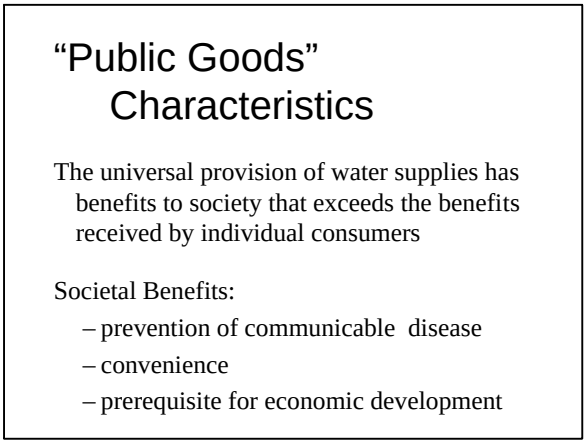
Current water treatment technologies also exhibit *economies of size*, that is, the unit cost (dollars per gallon) of treated water declines as larger volumes of water are treated. The production costs of treated water are therefore much less for larger water systems than smaller ones, and these savings can be shared with water consumers.

Natural monopolies are generally granted a secure *franchise* to operate within a certain service area without fear of competition. This allows the provider to capture the maximum stream of customer revenues from their service area, and to distribute the high fixed costs of water services across a large customer base.

It also avoids the social disruption that would occur if multiple providers were attempting to provide water services a single area. It is not hard to imagine the high costs and inconvenience of competing water utilities repeatedly digging up streets and sidewalks to service multiple water mains and distribution systems.

This single-provider franchise also means that water systems are rarely allowed to fail, even in situations where they have been managed poorly and are approaching bankruptcy. Invariably, assistance from some level of government will step in to ensure that customers do not go without water services. This support, while well intentioned, may inadvertently prop up systems that have poor management or unsustainable cost structures.

A *public good* is a good that, once produced, is equally available to all members of the community. The benefits that a person receives from a public good do not depend on how much that person contributes to providing it.



National defense is one commonly cited example of a public good. Once a government organizes the resources for national defense, everyone in the country is protected equally, regardless of how much they contributed in taxes. Public water supply can also have many of these same public goods characteristics.

With the passage of the Safe Drinking Water Act in 1974, the United States adopted a national program to ensure the universal availability of safe drinking water throughout the country. This national safe drinking water system benefits all of the people in the country – not just those people who pay the water bills that provide these services.

These public goods benefits include:

- prevention of communicable diseases
- convenience of assured drinking water safety throughout the country
- adequate water supply as a prerequisite for economic development

The natural monopoly and public goods characteristics of public water supply have resulted in the need for the regulation of drinking water systems at state and national level. Specifically, two types of regulatory activity are necessary:

1) *Price regulation*
   The monopolistic position that is awarded to drinking water systems requires some type of oversight to prevent abusive pricing practices. For publicly-operated systems, price setting is the responsibility of elected officials. Consumers exert price control through the electoral process. The control of price at privately-managed systems is the responsibility of public utility commissions or similar state regulatory bodies that must also answer to ratepayers and voters.

2) *National water quality regulation*.
   A nationwide system ensures the uniform provision of safe drinking water from *all* of the water systems throughout the country.

A system of universally "safe" drinking water requires that all system adhere to the same water quality standards. Water quality regulations must therefore be uniformly set and ultimately enforced by an agency with authority at the national level.

Although regulatory controls are needed to prevent monopolistic water systems from overcharging consumers and to protect public health, the costs of operating an effective, enforceable regulatory system can be substantial.

While total programmatic costs may be difficult to estimate, two general categories of regulatory costs that directly affect drinking water systems can be easily identified:

- costs that are driven by monitoring and enforcement activities, and
- costs that are driven by the need to install new infrastructure to meet regulatory guidelines

History of U.S. drinking water regulation

- Early US Public Health Service "Standards"
  - voluntary system of "recommended" quality standards based upon maximum level of contaminants in drinking water
- Safe Drinking Water Act 1974
  - State enforcement of SDWA regulations
- SDWA Amendments of 1986
  - rigid enforcement/increasing # of contaminants

The first regulation of drinking water supplies in the US took place in 1912. It acknowledged the role of contaminated water in the transmission of disease and consisted of a ban on the use of shared drinking utensils on interstate trains. Beginning in 1914 the US Public Health Service (USPHS) set standards for several known disease-causing microbes. These voluntary standards were periodically updated and expanded and were accepted by all states in the form of guidelines or regulations. Unfortunately, the 1969 Community Water Supply Survey conducted by the USPHS found that many State programs were understaffed and under-funded and that many public water supply systems failed to receive badly needed surveillance and technical assistance.

By the early 1970s the pollution of water sources had resulted in much publicized environmental calamities, such as burning rivers and poisoned water supplies. The public's call for action resulted in the passage of the 1972 Clean Water Act, followed in 1974 by the Safe Drinking Water Act (SDWA).

The SDWA built on the existing PHS guidelines, transforming the recommended maximum contaminant levels (MCL) into enforceable "regulated" levels, and establishing a program to investigate and identify other water supply contaminants that might pose a danger to consumers. Water providers were responsible for monitoring, analyzing, and reporting results, and alerting the public of any violations of contaminant standards. State agencies were required to establish a system of record keeping and enforcement.

The first major overhaul of the SDWA was the reauthorization Amendments of 1986. Troubled by the slow pace of implementation, Congress mandated a tougher federal role in drinking water regulation. These Amendments required EPA to: establish regulations for an increasing number of contaminants; mandate disinfection of all public water supplies; specify filtration requirements for most surface water systems; develop programs to protect ground water supplies; ban lead-based solder, pipes, flux in drinking water systems; specify best available technologies for each contaminant for which EPA was required to set an MCL.

The strict reforms mandated by the 1986 Amendments proved difficult to implement, and in 1992 Congress required EPA to prepare a progress report. EPA's 1993 report cited the difficulties in meeting the requirements for regulating so many additional contaminants, and pointed to the annual funding shortfall of State-mandated programs, estimated at

approximately $162 million. The report cited five separate General Accounting Office reports describing these funding shortfalls since the passage of the 1986 Amendments.

The 1993 EPA report also estimated the cost of implementing SDWA and found that smaller systems had the most difficult time in meeting new regulations. Because of their small service areas, the costs per customer were very high, and small systems often served the nation's most economically depressed service areas where consumers could ill-afford steep rate increases. The report also described President Clinton's proposal for a Drinking Water Revolving Loan Fund, and examined water system technical and financial "capacity", or ability of drinking water systems to monitor and treat regulated contaminants and to implement other SDWA regulations.

The most dramatic changes in the SDWA came in 1996, after years of discussion and interaction between all of the various drinking water constituencies. EPA's summary of the 1996 Amendments (*http://www.epa.gov/safewater/sdwa/theme.html#2*) identifies four main themes:

Better Consumer Information/"Right-to Know"

The Amendments require systems to prepare consumer confidence reports, and that the public be provided with or given access to other data collected, analyses done or implementation strategies developed under new SDWA programs. These consumer information provisions herald a new era of public involvement in safe drinking water. They were based on the premise that an improved understanding of water supply issues and public support are needed to address and prevent the future threats to drinking water quality.

1996 SDWA Amendments

Key themes:

1) Better consumer information
2) Regulatory improvement
3) Funding assistance
4) Pollution prevention
   - operator certification
   - source water protection
   - capacity development

Regulatory Improvements

The new amendments introduced science-based flexibilities and a better prioritization of effort to improve protection of public health. These regulatory improvements included risk-based contaminant selection, development of a national occurrence information database, cost-benefit analysis of new standards, and other provisions. Small systems received particular attention in the Amendments. Further details of the Amendment's small system provisions will be discussed later in this session.

Funding Assistance

For the first time since the beginning of national drinking water regulation, financial assistance was made available to drinking water systems. Federal funds were provided to the establish Drinking Water State Revolving Funds that made grants and low-interest

loans available. A portion of these funds in each state were earmarked for small drinking water systems.

Stronger Prevention Approaches
These Amendments established a strong new proactive approach to prevent contamination, and assist water systems to improve operations and avoid contamination problems.

Operator Certification:
Ensuring the knowledge and skills of public water system operators is one of the most important, cost-effective means to strengthen drinking water safety. Although every water system was not required to have a certified operator, they were required to have access to a certified operator to perform and monitor key compliance functions.

Source Water Protection
States were required to have a program for delineating source water areas of public water systems, and for assessing the susceptibility of such source waters to contamination.

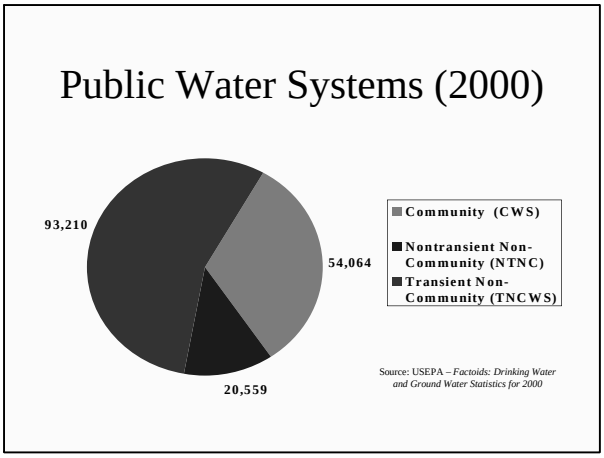
Capacity Development
States were required to create programs to assess and improve the managerial, technical, and financial ability of every water system to reliably deliver safe drinking water to its customers.

The 1996 Amendments included provisions that would make funding and technical assistance available to drinking water systems. In order to prevent the expenditure of scarce financial and technical resources on water systems that did not have the ability to safely provide water services over the long term, systems applying for assistance would need to demonstrate their *technical, financial,* and *managerial capacity* .

Small Systems and the 1996 Amendments

Concern for the nation's smallest drinking water systems had begun well before the passage of the 1974 Safe Drinking Water Act. Numerous reports and studies had already described the inadequate and even dangerous conditions at many small systems. It was generally assumed that the costs of meeting the new safe drinking water standards would force small systems to seek out regional solutions that could capture economies of size, and the so-called "small system problem" would disappear.

In fact, this did not happen, and in some states there was actually a proliferation of developer-built small systems as part of the rural and suburban sprawl that took place in the years following the passage of original SDWA. Increasingly stringent mandates of later SDWA Amendments did little to improve the situation. It was not until the 1996 Amendments that the SDWA specifically acknowledged the needs of small systems and contained provisions to provide financial and technical assistance.

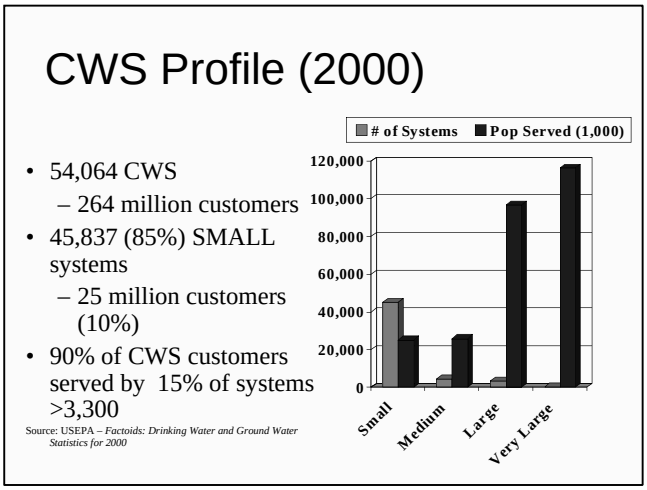


Small systems play an important role in the nation's safe drinking water framework. A review of the number and type of systems in the country helps to explain this role and the unique challenges to the effective regulation and management of small systems.

There are more than 170,000 "public" water systems in the US that are subject to some level of regulatory control under the SDWA.

Of these, about 32%, or more than 54,000 systems, are "community" water systems (CWS). These are systems that serve more than 25 people or 15 connections, year round, and are subject to the highest level of drinking water regulation. Nearly 95% of all water consumers in the US get their water from community water systems.

Of these 54,000 CWS, more than 45,000 systems are classified by EPA as "small" systems, or those that serve less than 3,300 people. This means that that there is a large number of systems (85%) serving a small percentage of the total population (10%).



The good news is that this concentration of customers at the nation's few large systems allows regulatory agencies to ensure safe drinking water for a large part of the nation's by monitoring relatively few water systems.

In fact, the 353 systems with more than 100,000 customer, serve more than 116 million people, nearly half (44%) of the nation's population.

The bad news is that this same distribution of systems makes it extremely difficult to monitor or provide adequate assistance to the large number of small systems in the country.

The majority of these small systems (about 32,000) have service populations of 500 people or less (serving a total population of about 5 million people). These small systems, like any small business face a variety of challenges in performing at the same level as their larger counterparts.

Some of these challenges can be attributed to the economics of size and location, others to history, others to changes in population demographics and/or environmental conditions, and still others to water system management.

Small System "Compliance Challenges"

- Deteriorated physical infrastructure
- Lack of access to capital
- Limited customer and rate base
- Inadequate rates and poor financial management
- Diseconomies of scale
- Limited technical and managerial capabilities

The challenges to small water system operations are well known by small system managers and have often been described in water resources newsletters and publications.

A representative list of small system challenges was presented by former USEPA small system coordinator Peter Shanagan, in an article in the American Water Works Journal (May, 1994).

These included:

- Deteriorated physical infrastructure
- Lack of access to capital
- Limited customer and rate base
- Inadequate rates and poor financial management
- Diseconomies of scale
- Limited technical and managerial capabilities

It is worth noting that most of the "challenges" on this list are either directly or indirectly connected to the economic realities and/or the financial management of small system systems.

SDWA Provisions for Small Systems

- New technology
- Variances
- 15% of DWSRF Reserved
- Finance/Technology Assistance Centers
- Conservation plans
- Capacity Development

The 1996 Amendments included a variety of approaches to provide small system managers with the tools that they could use to improve their systems. The first focused on developing new technologies designed for the particular needs of small systems. The Amendments ordered EPA to identify "affordable technologies for systems serving less than 10,000 customers, including point-of-use and point-of-entry treatment systems. In those cases where no affordable technologies are available EPA must identify "variance" technologies that provide the maximum protection affordable for specific groups of smaller systems with difficult to treat source waters. Several other forms of source water and time frame variances are available to small drinking water systems.

Another section of the Amendments requires that states reserve 15% of the funds available from their Drinking Water State Revolving Fund program for systems that serve less than 10,000 customers. These earmarked funds provide small systems with the opportunity to access low-cost loan funding without having to compete against larger systems.

The Amendments also funded the establishment and operation of nine *Technology Assistance Centers* (TACs). These centers conduct training and technical assistance relating to the information, performance, and technical needs of small water systems, and provide support for small water system research. This development of this workbook was sponsored by one of these Centers: the Midwest Technology Assistance Center. The Amendments also established a number of *Environmental Finance Centers*. While these EFCs provide assistance to all sizes of water systems, many of their efforts target smaller systems. *Ratio8*, a financial assessment tool designed by the EFC at Boise State University, is designed specifically to address the needs of small water systems. The final session of this workshop uses some of the tools from Ratio8 to practice calculating financial assessment indicator measures for a sample small system.

USEPA was also required to prepare water conservation plan guidelines for all sizes of water systems. States could require that systems prepare these plans as an eligibility condition for accessing funding from the revolving loan fund. A specific set of "basic" guidelines was developed specifically for use by small systems *(http://www.epa.gov/owm/water-efficiency/wave0319/basic1.htm).*

Finally, while all systems are required under these Amendments to demonstrate that they have the *capacity* to operate in a sustainable fashion over the long term, the Amendments recognized that it would be the smallest water systems that would have the most difficult time in meeting this requirement.

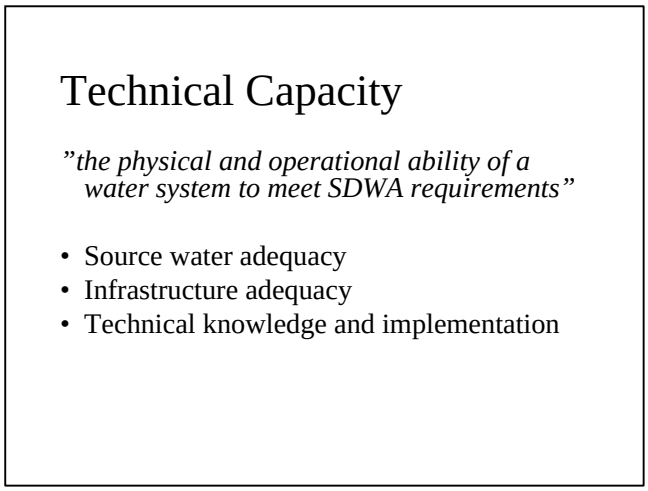
Capacity and Capacity Development

- Water system capacity is the ability to plan for, achieve, and maintain compliance with applicable drinking water standards
- Capacity development – the *process* of acquiring and maintaining adequate technical, managerial, and financial capabilities to enable them to consistently provide safe drinking water.

Water system *capacity* is defined as the ability to plan for, achieve, and maintain compliance with applicable drinking water standards. Capacity has three components: technical, managerial, and financial. In order to be truly sustainable water systems must have adequate capacity in all three areas.

Capacity development is the process by which systems achieve or maintain "capacity". The 1996 Amendments required States to develop and implement programs to ensure that new systems demonstrate capacity and to assist existing systems in acquiring and maintaining capacity. This new focus on demonstrating and improving water system performance was the key ingredient in the changes in the SDWA.

States failing to develop and implement such programs can loose up to 20% of their DWSRF allotment. Drinking water systems that cannot demonstrate adequate technical, managerial, and financial capacity to ensure compliance are not eligible for the low-interest loans available from the revolving loan fund. In the past, grants and loans were often provided to unsustainable systems and had sent an inappropriate signal to small communities, allowing them to undercharge for their services or mismanage finances only to be "rewarded" by programs that specifically targeted grants to small systems that were failing. This new approach mirrors the common business practice of denying loans to businesses that, in their current condition, will not able to repay them.



Implementation of the 1996 Amendments led to the development of numerous tools, publications, and trainings to help water system managers to understand and measure "capacity". The *Ratio8* financial assessment tool is a good example of one of the tools specifically designed to respond to the capacity development requirements.

Ratio8 defines Technical Capacity as: "the physical and operational ability of a water system to meet SDWA requirements".

The measurement of Technical Capacity should focus on three principal areas:

- *Source water adequacy.* Does the system have a reliable source of drinking water? Is the source of generally good quality and adequately protected?
- *Infrastructure adequacy.* Can the system provide water that meets SDWA standards? What is the condition of its infrastructure, including well(s) or source water intakes, treatment, storage, and distribution? What is the infrastructure's life expectancy? Does the system have a capital improvement plan?
- *Technical knowledge and implementation.* Is the system's operator certified? Does the operator have sufficient technical knowledge of applicable standards? Can the operator effectively implement this technical knowledge? Does the operator understand the system's technical and operational characteristics? Does the system have an effective operation and maintenance program?

Managerial capacity refers to the system's institutional and administrative capabilities and reflects the ability of a water system to conduct its affairs in a manner enabling the system to achieve and maintain compliance with SDWA requirements.

Assessment of managerial capacity must focus on three functions:

- *Ownership accountability.* Are the system owner(s) clearly identified? Can they be held accountable for the system?

- *Staffing and organization.* Are the system operator(s) and manager(s) clearly identified? Is the system properly organized and staffed? Do personnel understand the management aspects of regulatory requirements and system operations? Do they have adequate expertise to manage water system operations? Do personnel have the necessary licenses and certifications?

- *Effective external linkages.* Does the system interact well with customers, regulators, and other entities? Is the system aware of available external resources, such as technical and financial assistance?

Managerial Capacity

"ability of a water system to conduct its affairs in a manner enabling the system to achieve and maintain compliance with SDWA requirements"

- Ownership accountability
- Staffing and organization
- Effective external linkages

Financial capacity is a water system's ability to acquire and manage sufficient financial resources to allow the system to achieve and maintain compliance with SDWA requirements.

Financial Capacity

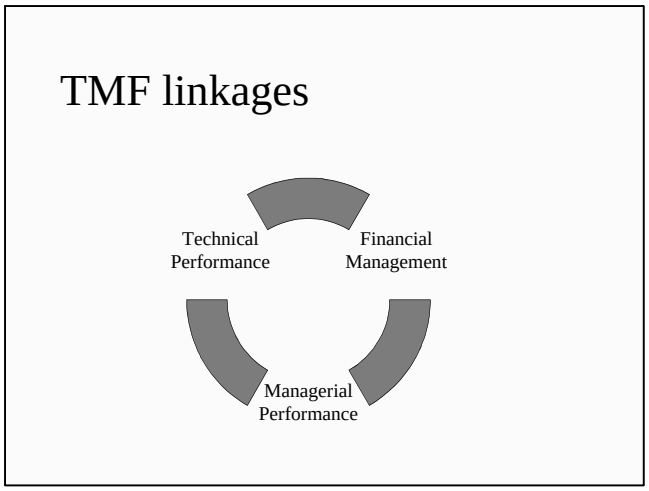
"ability of a water system to conduct its affairs in a manner enabling the system to achieve and maintain compliance with SDWA requirements"

- Revenue sufficiency
- Credit worthiness
- Fiscal management and controls

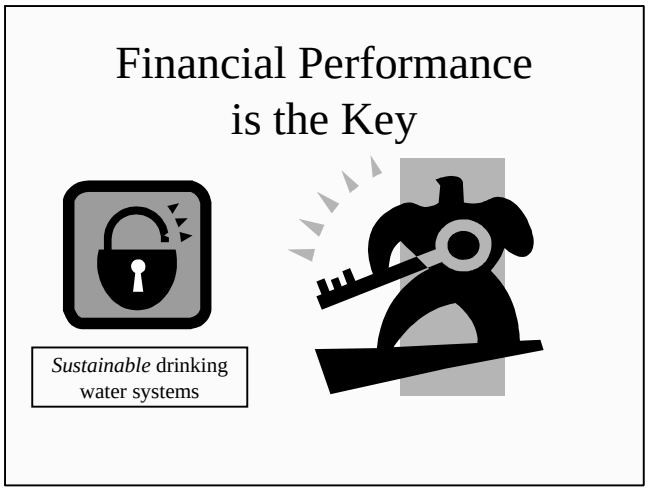
Three key functions must be assessed to assure adequate financial capacity:

- *Revenue sufficiency*. Do revenues cover costs? Are water rates and charges adequate to cover the cost of water?
- *Credit worthiness*. Is the system financially healthy? Does it have access to capital through public or private sources?
- *Fiscal management and controls*. Are adequate books and records maintained? Are appropriate budgeting, accounting, and financial planning methods used? Does the system manage its revenues effectively?

Technical, managerial, and financial performance are interconnected. Poor performance in one area will necessarily influence performance in both other areas.



However, the key ingredient in capacity development is financial performance.



This key role of financial performance has made it the focal point of efforts to improve small systems, and to provide funding for workshops such as this one.

Without adequate financial resources:

- There are not sufficient funds to hire or retain well-trained employees or to invest in continuous trainings to improve skills of current personnel
- There is not sufficient income or savings to pay for needed infrastructure improvements, proper maintenance of existing infrastructure, or to purchase the latest money-saving technologies
- Systems that cannot demonstrate their financial management abilities will be unable to secure loans at a reasonable interest rate.

Financial Capacity

Finances are **KEY** to successful water system management

Without adequate financial resources:

- cannot hire trained water managers or operators
- cannot afford to upgrade or improve infrastructure
- cannot obtain financing at a low-interest rates

In order to be "sustainable", water systems must be "business-like" so that they can be "self-supporting".

"Small systems must operate as a business"

- Water systems must operate as a business
- Should use business techniques to improve performance
- Benchmarking is one of the dominant performance improvement techniques

Therefore, the essential "financial capacity" message is that small systems *MUST OPERATE LIKE A BUSINESS*. This means that small systems can learn from the techniques used by other small business enterprises.

Benchmarking is one of the tools that has been adopted by business enterprises of all sizes to implement programs of constant performance assessment and improvement.

Benchmarking emerged from the tradition of performance assessment and improvement in the Japanese business community in the 1930s.

The Xerox Corporation is generally credited with introducing benchmarking to the business community in the United States, and used this technique to make dramatic improvements in their operations in the 1960.

Performance Assessment and Benchmarking

- Benchmarking began in the business community
- Governments have a long tradition of performance improvement and have recently adopted benchmarking
- Benchmarking is now common in the water industry

Performance improvement efforts have not been solely the domain of the business community. In the United States there is a long tradition of performance improvement programs at all levels of government activity.

The most recent reflection of this tradition was the passage of the 1993 *Government Results and Performance Act*. This legislation required all federal agencies to set strategic plans, establish performance goals, file annual reports on performance vs. goals – and make to make future appropriations contingent upon their performance. Benchmarking emerged as one of the principal tools of this *Reinventing Government* initiative.

Benchmarking has also become a commonly used tool by the larger systems in the drinking water industry. Examples of water industry benchmarking are presented in Session 3 as well as in the *Resource Guide* at the end of this workbook.

Session summary

- Small systems often operate at an economic disadvantage
- Drinking water regulation is necessary to assure safety and prevent monopolistic pricing, BUT regulation increases costs
- Financial management is the KEY to success
- Water systems must operate as a business enterprise
- Benchmarking is a useful performance assessment tool

This session has reviewed some of the characteristics of drinking water systems. It described the economies of size that are present in the provision of drinking water and the characteristics of drinking water systems that make it necessary for them to operate as regulated enterprises. While regulation is necessary, it also increases water system operating costs. These costs are often add a disproportionately larger burden on the smallest water systems.

The evolution of drinking water regulatory approaches was reviewed, including the latest efforts to motivate system management to assess and improve the technical, managerial, and financial capabilities of their systems. Of these three, it was shown why effective financial management was the key ingredient in small system performance and why all drinking water systems – including small systems – must "operate as a business".

Benchmarking is a powerful business tool that can be used to assess and improve all components of water services for both large and small systems. Financial benchmarking targets the key component of business success and can provide an excellent perspective of the overall health of small drinking water systems.

Session 1 Exercises

Exercise 1

The purpose of this exercise is to explore those management issues that are currently of greatest concern at your water system.

These areas of concern will help you to identify the functions at your water system that you will want to examine using benchmarking and other performance assessment techniques.

Comparison is a key element in benchmarking. The Exercise 1 Follow-Up on the next page will allow you to compare your responses to those of 350 other small system managers.

Please respond to the question below:

Which of the following decisions are you likely to make in the next 5 years?

Please check all that apply.

Then, rank the choices that you made *(1, 2, 3, etc…. with 1 being the most important)*.

- □ ____ INCREASE WATER RATES
- □ ____ CHANGE RATE STRUCTURE
- □ ____ EXPAND WATER SERVICES TO NEW AREAS
- □ ____ INSTALL NEW TREATMENT TECHNOLOGIES
- □ ____ CONSTRUCT NEW WATER SOURCES (WELLS OR RESERVOIR)
- □ ____ LOCATE SOURCES OF FUNDING ASSISTANCE
- □ ____ SWITCH FROM SELF-SUPPLIED TO PURCHASED WATER
- □ ____ SELL WHOLESALE WATER TO OTHER WATER SYSTEMS
- □ ____ ACQUIRE ANOTHER WATER SYSTEM
- □ ____ TRANSFER OWNERSHIP OF THE SYSTEM TO ANOTHER PROVIDER
- □ ____ OTHER *(please specify)* _____
- □ ____ OTHER *(please specify)* _____
- □ ____ OTHER *(please specify)* _____

Exercise 1 Follow-up

This question was used in during the survey phase of the *Benchmark Investigation* to assess the areas of concern that were considered to be most important by survey participants.

The table and test below summarizes the responses of the 350 small system managers who participated in the survey. An excerpt of the summary discussion of results from the *Benchmark Investigation Project Completion Report* appears below the table.

Compare your responses to those of the systems that participated in this survey.

What areas of concern do you have in common?
What areas of concern are different?

Impending decisions	N	%	Ranked as #1	Ranked as #2	Ranked as #3 +
Increase water rates	221	66	155	34	42
Expand services	129	39	32	30	27
Locate funding	123	37	30	25	34
Install new tech.	86	26	19	15	25
Change rate structure	85	26	10	24	22
Construct sources	79	24	22	17	16
Switch to purchased	32	10	11	4	11
Sell wholesale	29	9	2	4	14
Transfer ownership	18	5	6	3	6
Acquire system	14	4	1	1	7
Other	41	12			

The need to "increase water rates" was identified by 221 out of 350 total survey respondents (66 percent). This decision was also ranked the highest, with 155 respondents ranking it as #1. A decision to change water rates, a closely related issue, was indicated by 85 respondents (26 percent). Taken together these two decisions outdistance all other management concerns.

The next most frequently mentioned decisions (by nearly 40 percent of respondents to both) included "expanding water services to new areas" (129 respondents) and locating sources of funding assistance (123 respondents). Also, approximately one fourth of the respondents selected the installation of new treatment technologies (86 respondents) and construction of new water sources.

Although decisions related to water rates dominates all categories, a higher than average number of larger systems reported this decision. Municipal systems were more concerned about increasing rates and revising rate structures, and locating funding than other types of systems.

A higher than average proportion of systems serving more than 500 were concerned with decisions related to the expansion of service lines and finding sources of funding assistance. A higher than average number of systems serving more than 1,000 persons indicated future decisions about installing new treatment technologies. A higher than average proportion of surface water systems indicated the need to expand services, locate funding, install new technology, and sell water wholesale.

These survey responses suggest that the financial decisions faced by small public water supply systems prevail over technological issues.

Session 2

Benchmarking Basics

A Practical Introduction

> *"unless you are keeping score, it is difficult to tell if you are winning or loosing"*
>
> David Ammons, *Municipal Benchmarks: Assessing Local Performance and Establishing Community Standards*

This session presents a general overview of benchmarking as a performance assessment and improvement technique and introduces some of the basic benchmarking terminology and processes.

Although the focus of this workbook is on financial assessment at small water systems, the general approach presented in this session can be used to assess the performance of many different municipal functions, not just those related to drinking water systems. Session 3 then describes how this general approach has been specifically applied to assess the financial performance of drinking water systems.

Session Two:
Tasks:

1. Define benchmarking
2. Describe the benchmarking process

This session begins with a review of some of the many definitions of Benchmarking.

The application of benchmarking to wide variety of public and private enterprises, has resulted in an abundance of definitions as each organization customizes the description of the benchmarking process to meet their specific needs..

In each of the definitions that are presented, key words will be underlined, and these are used to develop lists of the ingredients of that are common to all benchmarking activities.

This is followed by the presentation of the "whys" and "hows" of benchmarking, including a step-by-step approach to the benchmarking process.

Defining Benchmarking

The Merriam-Webster Dictionary provides both a specific and a general definition of the term *benchmark.*

The original use of the word is derived from surveying, which is the art of measuring and recording the landscape and changes in the landscape in order to make and update maps. Without the topographic reference points provided by benchmarks, surveying would not be possible.

The term benchmark has also come to have a more general meaning that refers to a point of reference used in any measuring procedure.

bench·mark [bénch “märk]
noun

Date: circa 1842

1 : a mark on a permanent object indicating elevation and *serving as a reference* in topographic surveys and tidal observations

2 a: a *point of reference* from which *measurements* may be made
b: something that serves as a *standard* by which others may be measured or judged
c: a standardized problem or test that *serves as a basis for evaluation or comparison*

Merriam-Webster Dictionary (Online)

Mirriam-Webster states that the term “benchmarking” came into common usage in the mid-1970s and describes it as a process that involves studying what your “competitors” are doing as a way of improving your own organization’s performance.

bench·mark·ing [bénch "mär-king]
noun

Date: 1976

The study of a competitor's product or business practices in order to improve the performance of one's own company

Merriam-Webster Dictionary (Online)

This dictionary definition focuses on both the observation of competitors and performance improvement.

Definitions from specific business sectors help to expand on this definition considerably.

The definition from the United Kingdom’s Office of Public Services recognizes that benchmarking is an “efficiency tool” that can be used to compare performance not just against competitors but also against some “absolute standards”.

BENCHMARKING:

“An efficiency tool based on the principle of measuring the performance of one organization against a standard, whether absolute or relative to other organizations.”

Next Steps Team,
Office of Public Services,
Cabinet Office, United Kingdom

BENCHMARKING:

"… a continuous search for and application of significantly better practices that leads to superior competitive performance."

Westinghouse

The Westinghouse Corporation definition introduces the "continuous" nature of benchmarking, pointing out that benchmarking is not a short-term project but an ongoing process that becomes a normal part of business operations.

This definition also recognizes that the purpose of benchmarking is to identify and adopt those "better practices" that are found to improve performance.

In their short article describing practical approaches for public officials, Ken Bruder and Edward Gray point out that benchmarking is a "rigorous" process.

Benchmarking is NOT an informal or casual comparison between organizations, but is a systematic approach that employs carefully selected indicators capable of identifying and measuring critical performance differences.

BENCHMARKING:

"Simply put, benchmarking is a rigorous yet practical process for measuring your organization's performance and processes against those of best-in-class organizations, both public and private, and then using this analysis to improve services, operations, and cost position dramatically."

Public-Sector Benchmarking: A Practical Approach
Kenneth A. Bruder, Jr., and Edward M. Gray

Furthermore, comparisons ought to be made with the *best* organizations in a particular enterprise, in order to identify and adopt the process that those best-in-class performers have used to improve their performance.

BENCHMARKING:

The continuous, systematic process of measuring and assessing products, services and practices of recognized leaders in the field to determine the extent to which they might be adapted to achieve superior performance.

Guide X on Benchmarking and Best Practices
Treasury Board of Canada Secretariat

The Canadian Treasury Board includes many of these same elements in their definition of benchmarking, acknowledging the "continuous", "systematic", and "measurement" components of the process.

They also recommend that comparisons be made with not with just "any competitor", but with "recognized leaders". The business practices of these leaders are then "adapted" to fit your own organization in order to "achieve superior performance".

Richard Fischer's summary of performance measurement applications include a definition that not only points out the importance of making comparisons to other organizations, but also of using benchmarking to monitor performance over time *within* the organization.

This *internal* form of benchmarking is particularly useful in determining trends that are taking place within the organization and for the to evaluate whether performance improvement programs implemented by the organization are actually having their intended result.

BENCHMARKING:

"Benchmarking implies comparison both internally with previous performance and desired future targets, and externally against similar organizations performing similar functions.**"**

An Overview of Performance Measurement
Richard Fischer

BENCHMARKING definitions:

"A continuous process of improvement using comparisons to make change ."

QualServ Benchmarking Clearinghouse
American Water Works Association

Benchmarking has also become an important performance assessment tool in the water supply industry.

The *American Water Works Association QualServ* program uses a wide variety of approaches, including benchmarking, to assess and improve water services performance.

The *QualServ* benchmarking definition, while quite simple, effectively incorporates many of the concepts included in the previous definitions, highlighting the continuous nature of the process, the use of comparison, and the goal of making changes for improvement.

QualServ also notes on their web site that:

- Benchmarking is a tool to help you improve your business processes. Any business process can be benchmarked.
- Benchmarking is the process of identifying, understanding, and adapting outstanding practices from organizations anywhere in the world to help your organization to improve its performance.
- Benchmarking is a highly respected practice in the business world. It is an activity that looks outward to find best practices and high performance and then measures actual business operations against those goals.

Several common themes can be found in this collection of definitions.

BENCHMARKING:
key components:

- Business management tool
- Goal: Performance Improvement
- Systematic measurement
- Comparison to best-in-class
- Learning from *Best Practices* of others
- Continuous Process

- Benchmarking is a *performance assessment tool* that is used to assess, and more importantly, improve performance. It combines *learning* and *action.* It makes little sense to even begin a benchmarking assessment without a firm commitment to action.

- Benchmarking involves a *systematic* approach to *measurement*. Indicator measures are carefully selected on the basis of their ability to represent actual performance.

- The key to benchmarking is *comparison*. Carefully selected key indicator measures are the tool used to compare performance. Comparisons can be made to your own operations during a previous time period, to an acknowledged or recognized standard, or to measures from other firms.

- The purpose of this comparison is to identify those practices that allow one firm is able to perform better than its peers AND to adapt these practices for use at your business. Businesses learn how to improve their own performance through comparisons to firms that are the *best-in-class*.

- Finally – benchmarking is a *continuous process* that is constantly measuring and re-evaluating performance through comparison to your own performance and that of the recognized leaders in your field.

Why Benchmark?

There are both short and long answers available to answer the question, Why benchmark? At its simplest, benchmarking can help you "to find out where you're at and to plan where you are going".

Benchmarking does this by:

- establishing the criteria that underlie performance,
- identifying problem areas within respective services, and
- improving service delivery by importing best practices.

There are many ways that benchmarking can specifically help small drinking water systems:

Why Benchmark?

- Practicality (Why not?)
- Accountability
- Planning and Budgeting
- Operational improvement
- Evaluation
- Competitiveness

Practicality: Perhaps the real question that system managers should be asking is "Why not benchmark?" Most of the basic benchmark indicators can be easily calculated using information that should be readily available from utility records. Even the simplest evaluation and comparison can provide valuable management direction.

Accountability: Benchmarking provides a way for managers to demonstrate the efficiency of their systems to consumers; regulators, and lending institutions. Systems that benchmark have the evidence on hand that they need to demonstrate:

- to consumers, the importance of rates keeping pace with inflation and system maintenance and improvements
- to regulatory agencies, the ability to meet regulatory mandates and capacity development guidelines, and
- to lending institutions, the ability of system managers to meet lending obligations

Planning/Budgeting: Benchmarking provides a clear idea of the relationship of costs to income. If you know where you would like your utility to be in the future, you can use this information to make the plans that you will need to get there.

Operational improvement: Benchmarking can help you to quickly identify the strengths and weaknesses of your operations and take action to resolve problems and improve efficiency.

Evaluation: Benchmarking can be used to monitor and document the effectiveness of performance improvement programs. This can quickly tell you which of your efforts are working. Even more importantly, this documentation can be used to inform and involve your customers in these improvement efforts. This can be especially important to build customer support for rate increases that are needed to improve your system.

Competitiveness: Private-sector water services and consulting firms are rapidly becoming a force in the management of small drinking water systems. Benchmarking can help public works departments to compete against their private sector counterparts. There is no inherent reason why public drinking water systems can not be as efficient, or more efficient, than those in the private sector. Benchmarking analysis can be used by water system managers to demonstrate to rate payers, local officials, and drinking water regulators that the community's water system is operating efficiently.

Types of Benchmarking

There are two general types of benchmarking that are used in performance assessment programs.

The American Water Works Association defines these as:

TYPES OF BENCHMARKING

METRIC

"quantitative measurement of performance in terms of inputs, outputs, and the relationship between them"

PROCESS

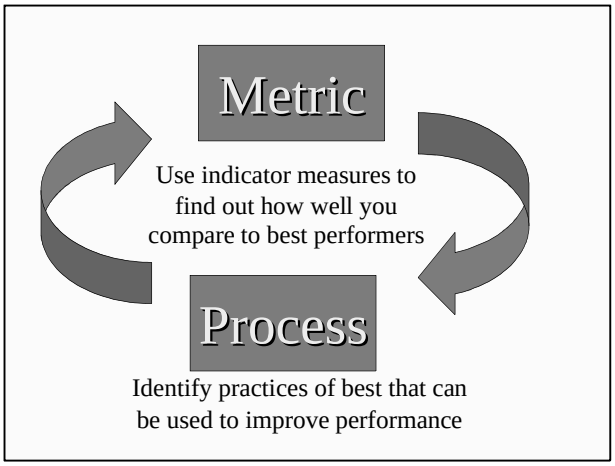
"the mapping of one's own processes and subsequent comparison of your process with those of other companies with exemplary performance in a similar process"

Metric Benchmarking is the *quantitative measurement* of performance in terms of inputs, outputs, and the relationship between them.

Process Benchmarking is the mapping of one's own *processes* and subsequent comparison of your process with those of other companies with exemplary performance in a similar process.

Simply put, metric benchmarking is the practice of using information that is in the records that you keep at your water system (or should be keeping) to calculate "performance indicator measures". These indicators are the yardsticks or measuring tools that are used to examine your water systems' performance in critical financial and operational functions.

Metric benchmarking provides the measures that are used to compare firms. Firms having the "best" levels of these indicator measures must be doing something right in order to have achieved this higher level of performance.



Once these "best-in-class" achievers are identified, a review of their business practices, or p*rocess benchmarking* investigation, can be conducted to find out what they are doing that helps them to achieve better results.

Metric and *process* benchmarking are combined in a cycle of measurement and investigation of what works to improve performance.

The Benchmarking Process

The benchmarking process has been described by many different authors and practitioners. The *Resource Guide* includes short summaries of step-by-step process recommended by several of these authors and organizations.

Benchmarking Steps

Before you start… *(minimum process check)*

1. Select process or function to investigate
2. Identify suitable performance measures
3. Select comparison sources/organizations
4. Collect "data"
5. Analyze data and present findings
6. Initiate performance improvement program
7. Recalibrate benchmarks (Repeat process ...)

The seven-step, benchmarking process presented in this workbook was developed by borrowing parts from several of these different approaches in order to create a generic benchmarking process.

It provides an overview of the process to guide those who are using benchmarking for the first time.

Benchmarking Preconditions

Benchmarking cannot take place in a vacuum. There are several pre-conditions that must be met before benchmarking can begin. The first and most important pre-condition is that your organization is genuinely interested in making change.

The benchmarking process will highlight those areas of the organization's performance that are not operating as effectively as possible. Staff members may fear that assessments that uncover problems may reflect poorly on them.

Benchmarking Steps – before you get started…

1. Are you prepared to make changes?
2. Do you have record keeping systems that will support investigation – consistent & time series
3. Do you have the resources (time, staff) to make commitment to long-term performance assessment efforts?

Therefore, the benchmarking analysis must be supported from the highest levels of authority of the organization, whether this is a corporate CEO or a small community mayor. Leaders must make a commitment to take actions to improve the organization.

Improving performance will require the complete cooperation of all members of the organization, especially those who are involved in the functions that will be examined. Leaders must assure staff members that the goal of benchmarking is on improvement and

not blame, and engage them in the collection of information and recommendations for improvement.

Once the organization as made a commitment to change, it will be necessary to have a record keeping system that can support performance assessment efforts.

For example, it would be impossible to assess the efficiency of a water delivery system without detailed records of water sales and pumpage, the number of miles of water lines maintained by the system, and the number of connections and customers. The types of performance assessment that an organization can perform are limited by the type and quality of the records that are available for use in the analysis.

A surprisingly large number of water systems do not keep accurate records of critical information that can be used in performance assessment efforts. Nearly 20 percent of the systems that participated in the *Benchmark Investigation* reported that they prepared no financial reports for their systems. Simple record keeping systems are now available for free from several sources, allowing small communities to quickly start to clock the types of information that they can use to assess performance.

The final ingredient necessary before beginning benchmarking is a commitment to allocate the necessary resources (time and money) to study performance, and design and implement performance improvement programs. This will be most difficult for the smallest systems, which have few, or even no, full-time employees. These systems may need to rely upon volunteers from the community to assist in the benchmarking process.

Step 1. Select the function to be investigated

The first step in benchmarking is to select the function that is in need of assessment and improvement.

Step 1.
Select function to be investigated

What "function" should you investigate FIRST?

Selection Criteria:

- What is essential to the organization's success?
- Where are we currently experiencing problems?
- What are the critical outputs in the problem areas?
- What products and services do we provide to our customers?
- What causes satisfaction/dissatisfaction?
- What are the critical cost components?
- What is the availability of data?

You probably already know which functions are performing well at your water system and which functions you suspect may be dragging down the overall performance of your system.

However, if you are not sure where to start your search for performance improvement, you may want to use the series of questions suggested in the AWWA benchmarking manual. These should help you to prioritize those functions that should be your primary concern.

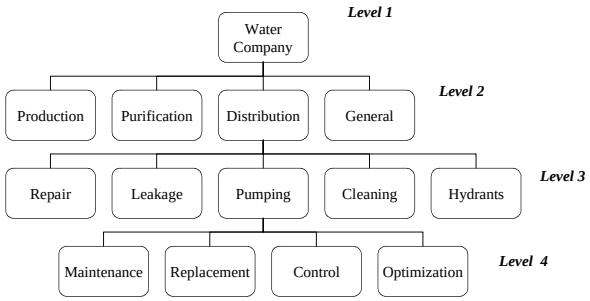
Other benchmarking guides also provide suggestions for identifying those functions to benchmark first. In his *Overview of Performance Measurement*, Richard Fischer suggests the following criteria for prioritizing the functions to be investigated:

1) The function makes up a high percentage of the cost
2) The function is a key service differentiator
3) The function appears to show room for improvement
4) The function is capable of being improved

A flow chart may be a useful tool to help in organizing the order of functions to be investigated. Flow charts can provide a useful perspective of the relationship of the function that you are investigating to the overall management of your system.

This flow chart from an AWWA publication demonstrates one way to view water system operational functions and help to visualize the different functional levels that are present in every organization.

Example:
Water system operational functions



For example, if distribution system performance was under investigation, this diagram could help to identify the various sub-functions that might yield valuable information through benchmarking, such as understanding the role of pump maintenance in the general scheme of water system operations.

Step 2. Identify key performance indicators

Measurement is what transforms comparison into benchmarking. The selection of indicator measures that truly reflect organizational performance is one of the most important and difficult aspects of benchmarking. Effective indicator measures are needed to uncover the differences in performance and to establish a link to the best-in-class organizations and practices.

Business researchers have conducted numerous studies to verify the connection between indicator measures and performance for many different types of business functions. Several studies have sought to establish this relationship for small system financial performance, including the MTAC-funded *Benchmark Investigation of Small Public Water System Economics*. The *Resource Guide* includes summaries of some of these studies, as well as others that describe various methods of selecting useful performance indicators.

Performance measures are very often expressed as ratios. Ratios are an excellent "shorthand" method for simultaneously comparing two different measures. When the

denominator of a ratio is a measure of size, the ratio also has the effect of 'normalizing" the comparison that is being made and allowing comparisons to be made between organizations or water systems of different sizes.

For example, the comparison of total operational costs of a system with 50,000 customers and a system with 500 customers would be basically meaningless. However, by putting this information in the form of the ratio, dollars per customer, we can now assess whether the smaller or larger system is more cost-efficient in providing water services to its customers.

Benchmarking practitioners have identified several categories of indicators measures as a way of clarifying the types of measurements that are useful in unraveling differences in performance. The number of categories suggested differs depending on the business function that is under investigation.

Step 2.
Identify key performance indicators

- Use to uncover differences in performance
- Most often expressed as RATIO s
- Categories
  - Costs
  - Workload
  - Efficiency

Does Your Government Measure Up? a handbook of performance measurement techniques for local government officials, recommends using three different categories of indicators measures.

Cost Indicators
Costs are generally the measure of greatest importance to business and water system managers. These measures are usually best expressed as a ratio with dollars in numerator, for example: operating costs per 1,000 gallons produced; operating cost per connection; net income per connection. Cost measures can be influenced by physical and operational characteristics of a system so care must be taken to consider the influence of these factors. For example, two small water systems may have the same number of connections. However, if one is a small village with a compact distribution system, and the other is a rural water district with many miles of transmission and distribution line, we should expect there to be differences in their operational costs per connection.

Workload Indicators
Workload indicators provide a measure the amount of goods or services provided. Examples of workload measures for water systems would include: the number of gallons produced annually or the number of meters read per day.

Efficiency Indicators
Efficiency indicators combine costs and workload measures to express the relationship between work performed and resources required. Some example of efficiency indicators might be dollars per gallon of water delivered, or dollars per meter read.

Indicator measures are most often drawn from the experience of other water systems or similar businesses. However, if no standard indicator measures are available for the function that you are investigating, the following characteristics, recommended by David Ammons in his book *Municipal Benchmarks,* should be considered when selecting a measure that can be used to assess performance:

Characteristics of GOOD indicators

- Valid
- Reliable
- Understandable
- Sensitive to cost
- Focus on organizational aspects that can be changed

- Valid – measure what they claim to measure
- Reliable – can make repeated measures with little variation
- Understandable – unmistakably clear meaning
- Timely – can be compiled promptly enough to be useful to managers
- Resistant to efforts to "beat the system" through actions that do not truly represent desired changes
- Comprehensive – measures capture the most important performance dimensions
- Non-redundant – each measure contributes something distinctive
- Sensitive to data collection cost – inexpensive enough in collection and analysis to be practical
- Focused on controllable facets of performance – emphasizes measures that are immediately applicable

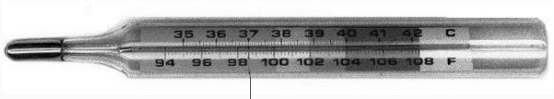
It is important to clarify the difference between *INDICATORS* and *BENCHMARKS*.

Indicators are those measures that have been shown to be related to the performance of the function that is being investigated.

Benchmarks are the point on the indicator measurement scale that discriminates between good and poor performance.

INDICATORS vs. BENCHMARKS

INDICATOR MEASURE for wellness is degrees of body temperature



98.6°
Normal Body Heat
benchmark

BENCHMARK for wellness is 98.6°

A thermometer analogy is often used to describe the distinction between these two terms. A common *indicator measure* of wellness is body temperature. The *benchmark* for this indicator measure is "normal" body temperature of 98.6° (Fahrenheit).

Step 3. Select comparison approach

Benchmarking requires both *Measurement* and *Comparison.*

Step 3.
Select comparison approach

- Logical/Absolute Measure
  - Compare to a measure that defines minimum effective performance
- Analysis over time (internal)
  - compare to self at different points in time
- Comparative method (external)
  - compare to best-in-class

Measurement begins with the selection of functions to examine (Step 1) and the identification indicator measures that are linked to the performance of this function (Step 2).

Having completed the measurement steps, a comparative process can then be used to evaluate performance. Several types of comparisons are commonly used by benchmarking practitioners; three are presented here.

The first approach is to compare the indicator measures calculated for the organization to some logical or absolute benchmark of performance that is linked to its basic mission. This type of comparison is most useful to assess the performance of basic of organizational functions.

For example, *net revenue* is calculated as the difference between revenues and expenditures, and measures the organization's ability to operate at a profit. This is the most basic measure of financial performance for all businesses. No organization that continues to loose money will be able to survive for long. Those with negative net revenues must immediately take actions that will reverse this situation. Another example of this type comparison is the ability of water systems to guarantee the "safeness" of their drinking water by meeting or exceeding the *maximum contaminant levels* that are enforced by USEPA. Systems that cannot provide safe drinking water will not be allowed to continue to operate.

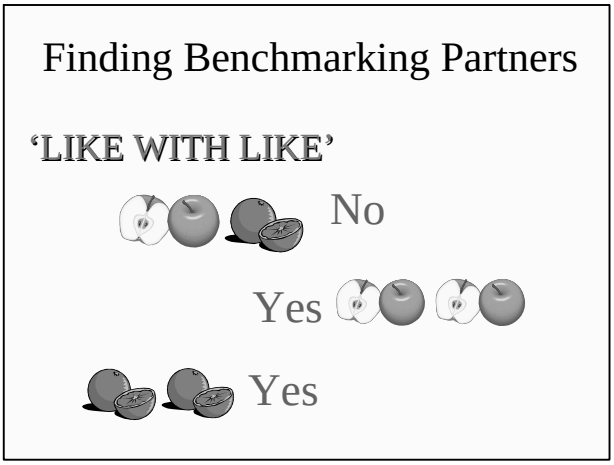
The second comparison approach is often called "internal" benchmarking or "trend analysis" because it compares performance measures for the same organization at different points in time. This form of benchmarking is most useful in determining trends in the organization's operation, or to track the success (or failure) of performance improvement programs.

Almost all performance measures are useful to track over time. For example, tracking the trends in "unaccounted for" water losses can provide valuable information to water system managers, and be used to assess whether or not to institute leak detection programs, or when and where to begin water line replacement programs.

The third approach compares the performance of one organization to that of its peers. In this type of "external benchmarking" the goal is to find benchmarking partners who are

the very best in the particular function that is being evaluated. These *best-in-class* performers are consulted in order to determine the practices that these organizations are using to achieve their high-level of *performance*. These practices can then be adopted and/or adapted by the benchmarking organization to improve its performance. External benchmarking is the most difficult, but also most valuable, type of comparison.

When making external comparisons between enterprises it is important to consider differences in their physical or operational characteristics that might unduly influence the indicator measures that are being used.



In other words, it is important to ensure that these are *"apples- to-apples"* comparisons. For example, Cromwell and Rubin's analysis of small system performance in Pennsylvania found that for some functions systems could not be compared across ownership types because of "differences in tax laws, financing methods, bond covenants, accounting practices" (see page A1-4).

Organizational size is probably the most important factor to consider when selecting benchmarking partners. Many enterprises, including water systems, are often able to take advantage of economies of size (bigger is cheaper) that affect some, but not all, organizational functions. The particular organizational attributes that need to be considered to ensure an *"apples- to-apples"* will vary by the function under investigation and type of organization.

Occasionally, very different types of organizations are compared as a way of learning about new techniques to improve specific functions. For example, an airline seeking to speed up slow ticket lines might well examine the practices used by McDonald's Restaurants to provide fast service to a large number of customers at the same time.

Step 4. Collect and review the data

Record keeping is one of the most basic functions of all organizations, and the information, or "data" needed to perform basic benchmarking analysis should be available from existing organizational files. While organizations may engage in special data collection efforts specifically to support benchmarking studies, this is almost always quite costly, and may not be an option for smaller enterprises.

The information that needs to be collected will be determined by the performance measures that have been selected. However, before beginning the benchmarking

analysis, it is important to confirm that the information being used is accurate and truly represents comparable measures of performance.

Data quality can be influenced by changes in personnel, record keeping systems, and water system equipment. For example, a water system that installs new customer water meters may experience not only more accurate reporting of water usage, but changes to the revenue generated from water sales. Indicator measures taken before the meter change-out may have to be discarded from any comparative analysis (unless of course, benchmarking was being used to confirm the positive impact of a meter change-out program).

Care must also be taken to ensure that the information being used to develop indicator measures is consistent over time for both the organization doing the benchmarking and those in the comparison peer group. Measures that may seem identical may in fact be quite different. For example, a small water system may have a village staff member who spends 50% of their time working on water system billing and bookkeeping and 50% on other village business. The way that this employee's salary is accounted for in the water system's financial records will influence the *operating cost* of the system. If the village government pays for all of this employee's salary, the operating cost for this system will not be comparable to those water systems that include billing and bookkeeping salaries in their operating costs. Likewise, if the village government changes their accounting practices and begins to pay 50% of the employee's salary from water system revenues, then the *operating cost* for the system will not be comparable over time.

Step 4
Collect and review the "data"

Be sure to know:

- Quality of available records
- Consistency of measurement
- Time value of money affect monetary variables

Another important consideration in making comparisons over time is the change in the *value* of money due to inflation. For example, $1.00 in 1980 had more than twice buying power ($2.06) than is does in 2006. Monetary indicator measures (i.e., total operations and maintenance cost: $/per 1,000 gallons sold) that are being compared over different time periods, must therefore be adjusted to account for the difference in value over time.

The Bureau of Labor Statistics (BLS) publishes a variety of specific price indices and instructions on how to adjust monetary amounts to make them comparable across time on their website. A simple "inflation calculator" is also available that should be adequate for most monetary comparisons be used for benchmarking purposes by small enterprises (*http://data.bls.gov/cgi-bin/cpicalc.pl*).

Community leaders and small water system managers may wish to take advantage of the wealth of publicly available information to perform preliminary benchmarking

comparisons. Performance information and standard indicator measures are available for a wide variety of municipal and water system functions on the Internet and from public libraries. The *Resource Guide* included at the end of this workbook contains information on where to locate some of this performance data. However, as with internal and peer group comparisons, it is important to review the data and methods used to prepare standard performance in publicly available sources before using them in benchmarking comparisons.

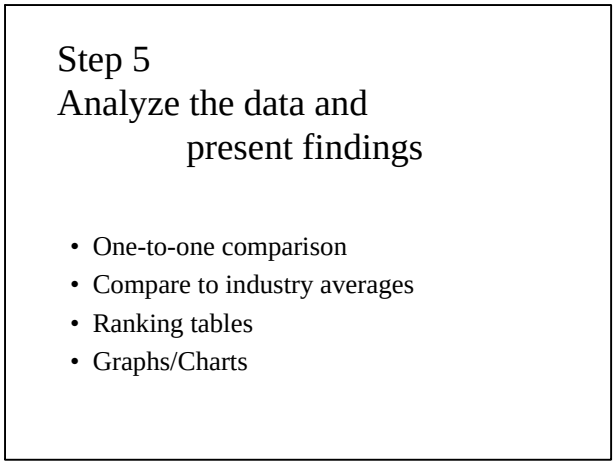
Step 5. Analyze the data and present the findings

Although numerous complex techniques can be used in benchmarking analysis, most common performance questions can be addressed through the use of simple comparative methods, using the "data" that has been collected from utility records and other sources.

The most basic approach is a one-to-one comparison of indicator measures over time (internal benchmarking), or between two or more businesses or water systems. Initial comparisons should focus on a single, basic performance measure. For example, in financial benchmarking, the most fundamental question that must be addressed is whether or not the business, or water system, is loosing money. This can be measured by *net revenue,* or the difference between total revenues and total expenditures.

If net revenues are found to be negative, then other indicator measures can be used to pursue follow-up comparisons to similar organization that have strong positive net revenues. This investigation will reveal those areas of revenue generation or expenditure control that are most in need of improvement.

After identifying specific areas where there are gaps in performance, the financial practices used by those businesses with positive net revenues (*best-in-class* performers) are reviewed in order to identify those practices that they use to achieve superior performance. The business that is loosing money can then adopt or adapt these practices to improve the performance of their organization



Benchmarking analysis can also begin with a simple comparison of indicator measures to industry averages. Moody's Investor Service, and other bond rating organizations, employ these types of comparisons to assess the performance of municipalities and water systems. While a careful comparison to detailed industry data may be a quick and

effective way to identify problem areas, it provides little guidance in the way of identifying those practices that can be used to improve performance.

Another analysis technique is to prepare "ranking tables". These tables describe the dimension being measured and list all of the organizations participating in a benchmarking comparison by their score(s) on selected performance measure(s). The listing is presented in rank order and provides businesses and utilities (and their customers) with a visual demonstration of those areas where improvement is needed.

The principal goal of benchmarking is performance improvement. Therefore, the findings from the analysis must be clearly communicated to decision makers, employees, ratepayers, voters, customers, and others who concerned about the operation of the organization. These groups will need to fully understand the situation if they are to be expected to contribute in the design and funding of performance improvement programs.

Easily interpreted graphs and charts are an especially effective way to provide a visual perspective to the numerical analysis. Preparing these graphic need not take any special training or consume an inordinate amount of time. Several no-cost tools, such as the *Ratio8* performance assessment system described in the *Resource Guide,* are capable of quickly producing useful charts and graphs with a minimum of effort.

Step 6. Plan and initiate a performance improvement program

The presentation of the benchmarking findings to decision makers and other relevant groups (consumers/customers) serves to create a broad consensus on the need to take action, as well as a concrete set of recommendations for actions that will improve performance in the functional areas under examination.

The recommendations that evolve from the analysis of the data and practices of the organizations involved in the benchmarking process must then be developed into a plan of action. Benchmarking practitioners describe several general categories of performance improvement activities.

Emulate the best-in-class programs directly adopt the practices learned from the best-in-class organizations.

Leapfrogging-the-competition programs combine what is learned from several best-in-class organizations to design new practices. By combining lessons from the "best-of-the-best" these programs have the potential to advance the performance of the benchmarking organization past that of all of its peers.

Change the rules programs are necessary in cases where the analysis has revealed that there is no way to achieve top-level performance without dramatic changes to the structure of the organization. In these cases performance gaps cannot be closed under the current operating and regulatory circumstances faced by the organization. For example, a

small, private water systems with aging infrastructure and fixed-income customers may conclude from their analysis that their best alternative would be purchase treated water from a regional water provider in order to share in the economies of scale in treatment that are available to larger water systems.

Step 6
Plan and initiate performance improvement program

- Analysis must result in specific recommendations for action
- Timelines
- Accountable individuals

Regardless of the type of action that is chosen, implementation must be explicitly set out in the plan of action. Timelines must be developed that describe each step of the implementation process and be strictly adhered to. Individuals within the benchmarking organization should be assigned to specific tasks and held accountable for the completion of these tasks, according to the timeline set out in the plan of action.

The implementation process must be not be allowed to stall. An incomplete performance improvement program that holds out the hope for a more effective organization, but that produce few or inadequate results, may permanently discourage members of the organization from further attempts to improve their organization, and be worse in the end than no program at all.

Step 7. Repeat the benchmarking process

By definition, benchmarking is a *continuous process*. Modern organizations are constantly striving to become the best-in-class in all operations and processes. After the recommendations from the benchmarking analysis have been implemented, the same indicator measures that were used to identify problem areas in the first place can be used to assess whether or not the performance improvement program has succeeded.

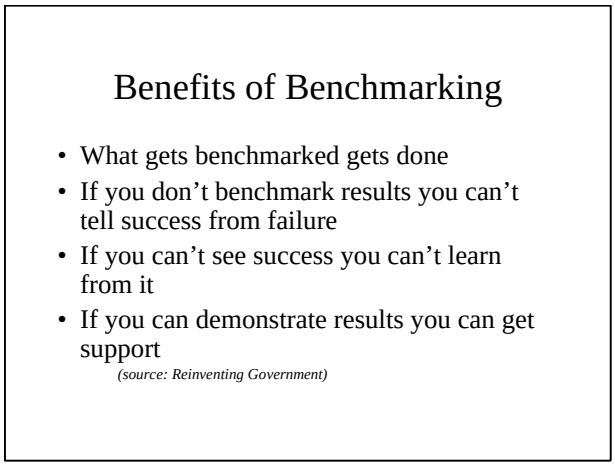
If the desired level of improvement is not achieved, the results of the benchmarking analysis can be re-assessed, and other practices of the best-in-class performers can be considered as performance improvement alternatives.

Once the performance goals for one function have been achieved, other functions should then be reviewed. Often improvement in one area,

Step 7
Repeat the benchmarking process

- Use benchmarks to examine success of performance improvement programs
- Conduct annual review of all functions
- Continue to strive for improvement

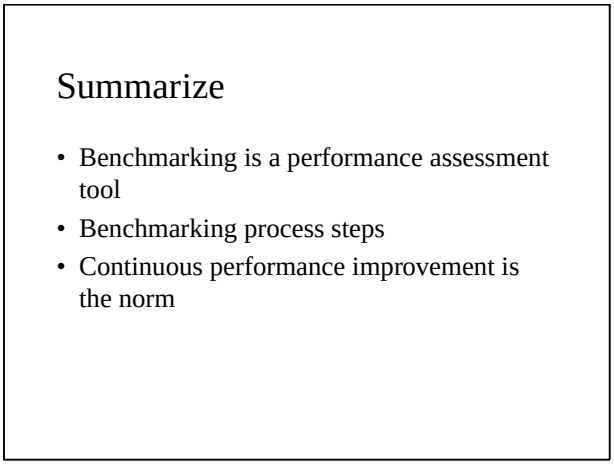
compliments performance in another, or may highlight previously unrecognized operational deficiencies. With the data collection and review procedures already in place, benchmarking can easily become a regular business management component. The ultimate goal of benchmarking is to become the *best-in-class* organization that others turn to when they are looking for practices to improve their own performance.



When done correctly, benchmarking is a cost-effective method to optimize business performance. Long lists of the benefits of benchmarking are often presented in benchmarking publications. For example, the *Reinventing Government* report (cited in the *Resource Guide*) provides a persuasive list of some of the simplest, but most valuable, benefits from benchmarking:

- What gets benchmarked gets done
- if you don't benchmark results you can't tell success from failure
- if you can't see success you can't learn from it
- if you can demonstrate results you can get support

This session has provided a basic background for understanding benchmarking and the benchmarking process.



Benchmarking is a performance assessment tool, which is based upon careful measurement of a key indicators, using comparison with other similar organizations to learn practices that have been demonstrated to improve performance.

The seven steps in the benchmarking process include: problem identification, selection of indicator measures and comparison methods, data collection and analysis, design and implementation of performance improvement programs, and recycling of the benchmark process.

Continuous performance assessment and improvement have become the standard for modern businesses and many public organizations. Water systems are no exception.

Session 2 Exercises

Exercise 2A.

Purpose

The purpose of this exercise is to review and discuss how well-prepared small drinking water systems are to begin the benchmarking process.

Based upon your knowledge and experience with your water system, please answer the following question:

Do you prepare any of the following financial summaries or reports for your water supply system?

- ❒ INCOME STATEMENT
- ❒ ANNUAL BUDGET
- ❒ ANNUAL FINANCIAL AUDIT
- ❒ REPORTS TO LENDING AGENCIES
- ❒ USER CHARGE ANALYSIS
- ❒ BALANCE SHEET
- ❒ YEAR-TO-DATE WORKSHEETS
- ❒ MONTHLY FINANCIAL REPORT
- ❒ CAPITAL IMPROVEMENT PLAN
- ❒ TECHNICAL, MANAGERIAL, AND FINANCIAL CAPACITY ANALYSIS (TFM)
- ❒ OTHER *(specify)* _____
- ❒ OTHER *(specify)* _____

❒ DO NOT PREPARE SEPARATE FINANCIAL REPORTS FOR WATER SYSTEM

❒ DO NOT PREPARE ANY REGULAR REPORTS FOR WATER SYSTEM

Exercise 2A.

FOLLOW-UP

This question was used during the *Benchmark Investigation* to assess what areas of concern participants in that survey considered to be of most importance in the management of their systems.

The tables below summarizes the responses of the 350 participants in the survey. An excerpt of the summary discussion of results from the *Benchmark Investigation Project Completion Report* appears below the tables. Use these results to consider the following questions:

How does your system compare to others in the Midwest in the types of financial records that it has available?

Do you think that your system has enough information available to easily assess the financial performance of your system?

Reporting	N	%
At least one or more reports	285	83
No reports for water system	57	17

Type of financial reports	N	%
Annual budget	187	55
Monthly financial report	142	41
Income	124	36
Annual financial audit	98	29
Balance sheet	93	27
Capital improvement plan	55	16
Reports to lending agencies	47	14
User charge analysis	38	11
TMF capacity analysis	11	3
Year to date worksheets	90	26

Approximately 83 percent of survey respondents prepare some type of a financial report for their systems. The use of financial reports was similar across all system sizes and types of supply sources. Significant differences in the distribution of answers were found among different types of system ownership.

Annual and monthly budget were the most frequently mentioned types of reports. More than 65 percent of publicly owned systems prepare an annual budget, and more than 48 percent prepare a monthly budget. Rural water districts reported more frequent use of balance sheets, capital improvement plans, reports to lending agencies, user charge analysis and year-to-date worksheets. The use of financial reports was lowest among mobile home parks and homeowner associations.

These results indicate that the majority of systems that responded to the survey prepare financial management reports, and have some information available to use in benchmarking evaluations.

Exercise 2B.

The purpose of this exercise is to explore how water characteristics affect financial performance, and how they influence the selection of comparable (*apples-to-apples)* water systems to use in the evaluation of water system performance.

This exercise uses some of the information that was provided by the water systems that participated in the *Benchmark Investigation*. This information is contained in the ***Water System Characteristics Data Sheet*** that is included at the end of this session.

Part 1.

Using the ***Water System Characteristics Data Sheet***, identify two characteristics (columns) that you think ***are most likely to influence their economic and financial management***. List the systems (by ID Code) that are part of the group that you have identified. Include a short description of grouping characteristic. Be prepared to explain how this grouping characteristic influences the financial position of these systems.

Example

ID Codes of the Systems in Group: *278, 176, 208, 202, 78, 114, 96, 150, 80*

Description of Grouping Characteristic: *Source water type*

How does this affect system finances? *Surface water systems are required to meet additional regulations resulting in larger water treatment costs*

ID Codes of the Systems in Group: _____

Description of Grouping Characteristic: _____

How does this affect system finances? _____

_____

ID Codes of the Systems in Group: _____

Description of Grouping Characteristic: _____

How does this affect system finances? _____

_____

Part 2.

Using the ***Water System Characteristics Data Sheet***, identify the water system (or systems) on this list that is most like your water system. Circle those characteristics that you think are most important to consider when choosing a system to use in benchmark comparisons.

	Your System	**System #1 ID#**	**System #2 ID#**	**System #3 *ID#***
		_____	_____	_____
Start Year	_____	_____	_____	_____
Owner Type	_____	_____	_____	_____
Source water	_____	_____	_____	_____
Pop. Served	_____	_____	_____	_____
Total Conn.	_____	_____	_____	_____
Avg. Prod. (gpd)	_____	_____	_____	_____
Miles of T&D	_____	_____	_____	_____
# storage facilities	_____	_____	_____	_____
# of full-time emp.	_____	_____	_____	_____
Other _____	_____	_____	_____	_____
Other _____	_____	_____	_____	_____
Other _____	_____	_____	_____	_____
Other _____	_____	_____	_____	_____
Other _____	_____	_____	_____	_____

Water System Characteristics Data Sheet

ID Code	Start Year	Owner Type	Source water	Pop. served	Total Conn.	Avg. Prod. (gpd)	Miles of T&D	# of storage facilites	# of full-time emp.	% unacc. water	SDWA Viol.	# of boil water order
182	1977	Other Public	GW	21	21	11,000	0.5	1	1.5	7.8	0	0
322	1957	Municipal	GW	81	27	5,500	2.0	1	0.5	*missing*	0	0
168	1950	Municipal	GW	82	51	10,000	3.0	1	0.5	0.1	6	0
76	1967	Municipal	Purchased	100	86	9,200	2.0	1	1	14.1	4	0
247	1976	Other Public	Purchased	125	56	10,450	28.0	1	0	15.3	1	0
4	1987	Other Public	Purchased	128	136	*missing*	*missing*	0	1.5	0	2	0
339	1912	Municipal	GW	145	54	6,000	0.6	1	0.5	*missing*	2	1
185	1978	Municipal	GW	200	97	21,605	3.8	1	0.5	18.2	2	0
196	1948	Municipal	Purchased	200	100	12,000	8.0	1	0.5	1.7	2	0
213	1940	Municipal	Purchased	200	99	11,000	7.0	1	0.5	14	0	0
278	*missing*	Municipal	SW	278	141	20,000	8.0	1	1.5	6.7	0	0
293	1959	Municipal	Purchased	325	128	18,500	6.0	1	0.5	*missing*	0	0
176	1927	Municipal	SW	396	224	35,000	6.4	0	2	*missing*	0	0
281	1895	Municipal	GW	400	283	54,900	3.8	1	2.5	50.1	1	0
142	1985	Other Public	Purchased	481	481	183,830	100.0	2	1.5	34.3	0	0
101	1948	Municipal	GW	761	280	54,000	4.3	1	2	1.2	0	0
89	1966	Municipal	Purchased	850	415	102,900	6.8	1	2.5	35.1	0	0
208	1972	Other Public	SW	900	350	69,000	200.0	3	2	*missing*	0	0
309	1910	Municipal	GW	983	581	257,257	10.0	2	3	24.7	0	0
202	1930	Municipal	SW	996	563	122,900	10.0	2	2	20.5	0	2
252	1981	Other Public	Purchased	1,000	430	88,537	55.0	1	0	14.2	2	0
78	1936	Municipal	SW	1,100	448	89,000	12.0	2	2.5	13.6	0	15
195	1930	Municipal	Purchased	1,100	538	93,959	7.9	0	2	*missing*	1	0
238	1994	Other Public	GW	1,300	437	153,000	300.0	2	2	6.9	0	0
312	1905	Municipal	GW	1,326	637	122,500	30.0	1	2	*missing*	0	0
114	1981	Municipal	SW	1,500	626	375,789	364.0	5	4	2.5	0	0
303	1995	Other Public	GW	1,700	720	108,000	112.0	*missing*	1	15	0	2
321	1912	Municipal	GW	1,700	535	250,000	10.0	1	9	12	4	0
96	1924	Municipal	SW	1,850	1080	225,000	16.0	2	4	30.8	0	1
225	1920	Municipal	GW	2,000	560	225,000	10.0	2	3	12.7	3	0
194	1970	Other Public	Purchased	2,781	927	200,159	130.0	1	2	*missing*	1	4
150	1989	Municipal	SW	3,100	1383	344,575	36.0	2	4	2.5	0	0
80	1812	Municipal	SW	3,300	1350	400,000	17.0	1	6	54.6	0	0
1	1980	Other Public	GW	3,500	960	656,000	10.0	2	1.5	12.9	2	0

Session 3

Water System Financial Benchmarking

> *"Benchmarks are everywhere, though most people probably never think of them as such.*
>
> *When buying a stock, for instance, analysts make recommendations based on performance indicators such as earnings ratio, percent of debt, expected profit, and past performance. These are standardized and validated benchmarks against which most stocks can be compared.*
>
> *On a golf course, par is the benchmark against which golfers are judged—on each hole and on total performance in the round."*
>
> Richard Fisher
> *An Overview of Performance Measurement*

Session 2 presented basic benchmarking, concepts, definitions, and processes. Session 3 describes how benchmarking has been applied to water system financial management. The information presented in the first two session will be reviewed, with specific examples of water system applications and tools and research.

REVIEW

Capacity Development guidance:

Water systems ***must operate like a business***

- Must satisfy customers AND meet regulatory requirements
- Must be self-sustaining
- Must have procedures to monitor performance

BENCHMARKING is the performance improvement technique of choice for many modern businesses

Water system management began a new era with the passage of the 1996 Safe Drinking Water Act Amendments.

This is especially reflected in the Act's *Capacity Development* provisions that are designed to ensure that all drinking water systems are financially self-sustaining and able to meet or exceed SDWA water safety requirements.

The recommended recipe for sustainability is for water systems to "operate like a business". This business-like operation includes the use of performance improvement techniques to put their operations on the path to constant improvement. One of the most-

often used tools for performance improvement by businesses is benchmarking. There are many different recommended procedures to perform benchmarking.

A 7-step approach has been presented in this workbook:

1. Select process or function to investigate
2. Identify suitable performance measures
3. Select comparison method
4. Collect data
5. Analyze data and present findings
6. Initiate performance improvement program
7. Recalibrate benchmarks (Repeat process ...)

REVIEW

Benchmarking Steps

Before you start… *(minimum process check)*

1. Select process or function to investigate
2. Identify suitable performance measures
3. Select comparison method
4. Collect the "data"
5. Analyze data and present findings
6. Initiate performance improvement program
7. Recalibrate benchmarks (Repeat process ...)

Several "preconditions" must be addressed before even beginning the benchmarking process. Key members of the management team – and often local political leaders – must be fully committed to the investigation of performance and prepared to take whatever actions are needed to improve the water system. The assessment process must be not be viewed as method to assign fault, but rather as way to improve performance. All alternative practices that will help the water system to achieve this goal must be able to be considered.

Before you begin…

- Need commitment to change
- Need good records
  - financial records
  - operational records
  - documents of past improvement activities
  - community information
- Identify benchmarking team

The benchmarking process will also require a record keeping system capable of providing the "data" that needed to prepare at least a minimal number of key indicator measures that can be used to assess performance.

Both financial and operational records are necessary for even the most basic assessments. Multi-year records support many more useful comparisons and analysis than records for just a single year. Documentation of past performance improvement activities, and information on the economic conditions of the community and service area are useful in examining trends in management and performance and examining the interaction of the water system with the communities that it serves

Useful financial records include:

- Income Statement
- Balance Sheet
- Delinquent billing accounts
- Loan repayment schedule
- Saving and investment accounts

Useful operational records include:

- Total population of service area; number of persons served
- Number of residential and non-residential connections served
- Annual volume of water pumped to each kind of connection
- Volumes of water provided for "public" use
- Asset information: quantity, age, and type of infrastructure

The importance of record keeping to benchmarking cannot be stressed too much. Record keeping is so important to water system financial performance that it is often used as one of the key measure of performance by organizations that conduct performance assessments. A water system that has sloppy or inadequate records is unlikely to be capable of effective performance in any financial or operational areas.

Preparing for a benchmarking assessment requires the selection of those members of the organization who will be responsible for performing each of the steps of the benchmarking process. Time lines need to be set for the completion of each task, and members of the team will need to be supported by those in the organization that have control over the resources (information and funding) needed to conduct the assessment..

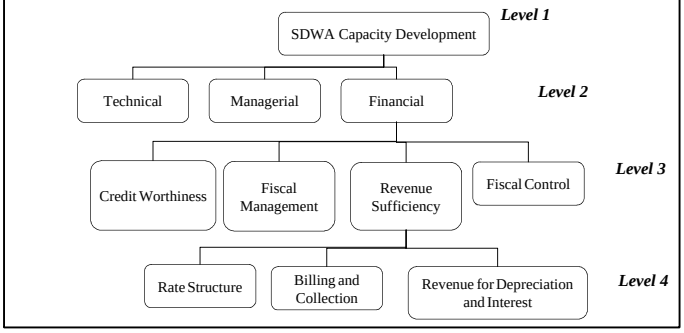
Once the pre-conditions have been addressed, the benchmarking process can begin. The first step is to carefully select the function or process that is most important to investigate, and to understand how this function is linked to the other financial or organizational functions.

A flow chart may be a helpful tool for getting in identifying these financial functions that require investigation.

The sample flow chart presented on this page represents the *Capacity Development* approach to water system functions as described in the *Ratio8* manual. It presents capacity development in terms of its three principal components: technical, managerial, and financial management.

Step 1.
Select function to investigate
(WHAT to benchmark)

Financial Functions Flow Chart



The central financial functions can then be broken down further into several sub-functions: revenue sufficiency, credit worthiness, and fiscal management and control. The process of reducing the scope of functional areas can be continued until reaching the level of organizational practices where problems may be found. For example, the revenue sufficiency function can be further subdivided into those activities related to the rate structure, billing and collection, and the generation and management of funds to cover depreciation and interest payments.

While flow charts may be an effective means for water system staff to identify critital water system financial functions, efforts should be made to convey this same information to civic leaders and water system customers in more general terms. For example, in their article *Linking Full-Cost Recovery and Sustainability*, John Cromwell and Jeff Jordan, describe the same central water system financial functions in another way:

- The ability to raise the cash needed for day-to-day operations and to make payments on long-term debt.
- The ability to keep costs under control and to prevent other departments or sectors to spend funds that are being saved to pay for future expenses.
- The ability to plan for future cash needs

The second step of the benchmarking process is to select the indicator measure or measures that will be used in the benchmarking analysis.

Step 2. Select indicator measures

Moody's Investors Service Ratings

Moody's Financial Indicators

Indicator for Water Enterprises	*1988 Median*	*Formula*
Operating Ratio	70.1%	Operating & maintenance expenses divided by total operating revenues
Net Take-Down	34%	Net revenues divided by gross revenue & income.
Interest Coverage	4.08	Net revenues divided by interest requirements for year.
Debt Service Coverage	2.18	Net revenues divided by annual principal & interest requirements.
Debt Service Safety Margin	23.6%	Net revenues less annual principal & interest requirements divided by gross revenue & income
Debt Ratio	33.1%	Net funded debt divided by the sum of net fixed assets plus net working capital.

Financial management is a core business function that has received much attention from analysts and researchers. Numerous financial indicators have been developed and tested through years of research and practical application. A long list of common indicator measures is available that can be used to assess the financial performance of water systems and other businesses.

For example, *Moody's Investors Service* uses publicly available financial information from water utilities to prepare and publish numerous indicator measures that have been linked to various aspects of financial performance. Moody's uses these indicators to develop ratings of the amount of risk that would be incurred when purchasing the bonds that finance many major water system infrastructure projects. The table on this page presents a partial list of some of these measures, along with their definitions and the median values of the systems in their database for 1988. (Source: *1988 Medians: Selected Indicators of Municipal Performance*)

Moody's Financial Indicators table also provides an opportunity to highlight some of the cautions that need to be considered when using published performance indicators in benchmarking comparisons.

1) Some of the most common indicator measures appear in many different publications. However, ratios with the same name are often are calculated differently. For example, in the Moody's assessment procedure, the measure *Operating Ratio* is calculated using "total operating revenues". Other analysts (see the *Resource Guide*) calculate *Operating Ratio* using total system revenues; yet others calculate it using operating and maintenance expenses AND depreciation. It is important when using indicator measures from published sources to verify how each indicator is calculated to be sure that they are consistent with the measures that you are using.

2) The composition of the group used to derive Moody's median measures is not stated, and depending on the measure being used, may not be comparable to all sizes and types of water system. Whenever possible, information about the group of systems that were used to derive indicator measures should be obtained in order to ensure that these measures provide real *apples-to-apples* comparisons.

3) The indicator measures presented in this table are medians. A median value represents the point where 50% of the systems have higher values and 50% have lower values. Medians do not necessarily represent a "benchmark" value. Additional information may be required to understand how a position above or below the median relates to performance.

The widespread use of these performance assessment indicators demonstrates their usefulness in performance assessment when carefully matched to the functions that are being measured.

Excellence in Water Services
QualServe

American Water Works Association

Yardsticks for a healthy water system

Ratio	*Range*
Return on assets	6 to 10%
Current ratio	1.5 - 2.1
Debt to equity	2.1 - 3.1
Operating ratio	1.2 and above
Cash flow coverage	1.5 and above

The American Water Works Association program to improve water system performance is known as *Qualserve*.

The *Qualserve* program makes extensive use of benchmarking to assess performance of water system functions, including financial functions. The five main indicator measures used during a *Qualserve* financial assessment appear in the table above.

The *Qualserve* ratios are accompanied by a set of "*yardsticks*" or performance "benchmarks" used by the program. Systems whose financial ratios are outside of these recommended ranges of values are advised to examine the financial practices used by their system. Each of the performance measures used by *Qualserv* targets a different function of financial management. (More information on the *Qualserv* program can be found by visiting the American Water Works Association website at: *www.awwa.org.*)

Several more published sources containing financial indicator measures are described in the *Resource Guide.*

After selecting the financial functions that are in need of review and the indicator measures that can be used to assess these functions, the method of comparison must be selected. Many standard financial measures are based upon straightforward accounting logic, and allow for simple logical comparisons to be made using these standards. For example:

- Cash flow: In the short term, a business must generate enough revenue to pay the bills "to keep the lights on."
- Net revenue: In the long term, all businesses must generate at least break-even to remain in operation.
- Debt service: - must generate enough revenue to meet both cash and debt payments to avoid penalties for late debt payments

When done on an annual, or even monthly, basis these straightforward measures provide the basic assurance of successful management.

Step 3.
Determine comparison method

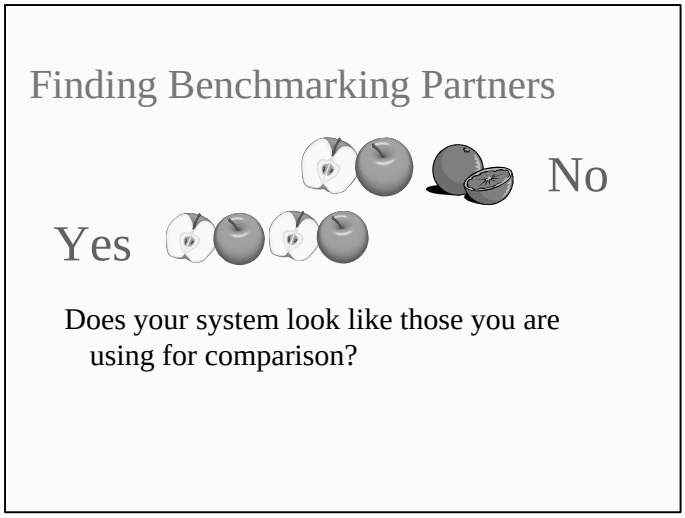
- *Standard* measures of business success
- *Time series* comparisons check improvement programs and inflation
- *Peer group* comparisons identify best practices

Many small water systems have developed an unfortunate "tradition" of having long periods of time between rate increases. Time series comparisons are especially useful to quantify the increasing costs and erosion of the value of revenues due to inflation. This information can then be used to demonstrate to customers the need for regular rate increases.

Time series assessments also provide a way to measure the success (or failure) or performance improvement programs.

External comparisons to a peer group of systems provide the highest potential for capturing new ideas that can rapidly improve water system performance. External benchmarking is the mechanism that can identify the practices that best-in-class performers are using to achieve superior performance in the function that is being benchmarked.

Comparisons between systems can be made using published sources, by making personal contacts with other water systems, or both. When conducting external benchmarking, it is valuable to obtain comparative measures from more than one system. The AWWA benchmarking study recommends selecting a minimum of six systems to use in the comparison of indicator measures.



However, the need for "apples-to-apples" comparisons is especially important in financial benchmarking. Many of the basic characteristics of water systems can result in dramatically different expenditures or revenue generation situations that are beyond the control of system managers. For example, a water system that serves a small, compact rural village is likely to have significantly different costs and concerns from a rural water system that serves two counties, even though they may serve exactly the same number of customers.

In their analysis of water system performance assessment the American Water Works Association Research Foundation describes characteristics of a water system that are beyond management control as "explanatory" factors, that must always be taken into consideration during benchmarking comparisons. Some of these factors are:

- Physical size
- Expenses
- Customer demography
- Water consumption
- Asset stock
- Human resources
- Ownership structure
- Sources of water
- Treatment facilities
- Billing practices

Whether an explanatory factor is important or not will depend upon the function that is being studied.

For some functions, it may be useful to seek out comparative data and practices from dissimilar water systems, or even examine how these functions are being performed by an entirely different type of firm. For example, a water system searching to improve its billing method might compare its billing system to those used by local banks in sending out their monthly statements. This "out-of-category" form of benchmarking may provide valuable insights that might not be possible from only examining water system billing practices

Step 4
Data collection

- Logical/internal comparisons
  - Balance sheet/income statement
  - Water records
- External comparisons
  - Published reports
  - Data sharing with other systems
  - Establishing relationships with other systems

For logical and internal benchmarking comparisons, all of the data must come directly from current and historical water system records. A substantial number of established indicator measures can be derived directly from basic financial and operational records, such as balance sheets and income statements. As stated above, caution should be used to be sure when employing "standard" indicator measures to be sure that these are calculated in a consistent fashion.

There are a great many published reports that provide detailed financial information on individual and groups of water systems that can be used for external benchmarking. The *Resource Guide* provides guidance on where some of these are located. State and Federal water resources and finance agencies, industry organizations such as the American Water Works Association, bond rating houses, and other reports and research publications all have different sources of data that may be useful in identifying performance indicators. Some of these reports also provide recommendations of the appropriate level of performance, or *benchmark value,* which can signal the cut-off between success and failure.

The greatest potential for using benchmarking in order to improve performance lies in making direct comparisons to willing benchmarking partners, preferably those that have been identified as the *best-in-class* performers. Most water system managers are already familiar with this process from the many "casual benchmarking" comparisons that take place at conferences, trainings, and other events that bring water system managers together. "Formal" benchmarking improves on this process by insuring that comparisons are based upon identical indicator measures that observed business practices are carefully noted and acted upon.

Locating benchmarking partners can be the most difficult aspect of the entire process. However, performance assessment has become more common as regulatory agencies,

technical assistance organization, and progressive system managers have responded to the Capacity Development provisions of the SDWA Amendments.

Step 5
Analyze the data and present findings

- Do the numbers make sense
- Compare performance indicators
- Determine performance gaps
- Search for best practices
- Communicate information

After the work of data collection has been completed, analysis must begin. Although complex forms of analysis are frequently used by large corporations and water systems, a considerable amount of useful information can be obtained from even simple comparative analysis.

The first step in any analysis is to perform a review of the data to make sure that it makes sense. If the values of the indicator measures being compared are wildly different, there may be differences in the way that the indicators were calculated, a mismatch in the selection of benchmarking partners, errors in mathematical calculation, or some other problem that has nothing to do with actual differences in performance.

The next step in the analysis is to organize the data so that the gap in performance between your systems and the best-in-class systems can be determined. If gaps in performance are found, the reason(s) for the difference(s) must be investigated. This may require a sequential series of comparisons using several other indicator measures until the function that is most likely the source of best-practices is identified. The final step is to contact those best-in-class performers to determine what those practices that have contributed to the benchmark indicator values.

The findings from the benchmarking analysis and search for best practices must then be communicated to the water system management, local government officials, and the public. These results need to be organized in a way that will result in a discussion of alternatives that can be used to improve performance. Several of the software tools listed in the *Resource Guide* can be used to produce effective visual presentations to convey the results if the analysis and guide this discussion.

The most important step in the benchmarking process is to use the results of the analysis to improve water system financial performance. Action plans must be explicit, timelines must be agreed upon, and responsibilities transferred to the persons who are responsible for implementation of the plans. Specific, measurable performance goals should be established, so that system managers will be able to demonstrate that the desired improvements have been made.

It may be possible to adopt or slightly adapt the practices of the *best-in-class* performers as a way of improving own water system's performance. The review of the best practices of a number of systems many also facilitate the development of completely new processes that can be adopted by other water systems to improve performance.

Step 6
Initiate a performance improvement program

- Develop action plan
- Assign responsibilities for implementation
- Set performance goals and timelines

The results of the analysis may also reveal that the system that has conducted the benchmarking has no little or no chance of becoming financially sustainable in its current physical or institutional configuration. In these cases, the system must consider completely restructuring its operations, taking actions such as abandoning a failing water source and purchasing water from a regional supplier, merging with another system to achieve economies of size, or contracting out some or all of the management of the water system to a private management firm.

By definition, benchmarking is a continuous process. Therefore the final step in the benchmarking process is to continue to use comparative performance assessment to monitor performance improvement programs and re-evaluate over-all water system financial performance.

Step 7
Recalibrate benchmarks

- Monitor performance improvement programs
- Re-evaluate over all performance
- Search for other avenues of performance improvement

Regardless of the type of performance improvement program that is chosen, follow-up data collection and analysis must be conducted. This form of internal benchmarking ensures that the desired performance achievement targets have been achieved.

Because of the interrelationship of all water system functions, it is likely that performance improvement programs intiated in one functional area are likely to impact other functions, creating opportunities for improvements in these areas. For example, the introduction of a new computerized billing system to address problems with uncollected revenues may also lead to a review of meter reading procedures or unaccounted for water losses.

Water system managers face numerous challenges in today's tougher operating environment. Aging infrastructure, pervasive water pollution, tougher, more complex regulations, and consumer resistance to rate hikes all contribute to the difficulties in achieving exemplary water system performance. The smallest drinking water systems, with few employees and the inability to capture economies of scale often have the most difficult time in responding to these challenges.

The 1996 SDWA Amendments required all drinking water systems to demonstrate their technical, managerial, and financial capacity, or ability to operate their systems in a sustainable manner. Financial capacity was considered to be the key ingredient for system sustainability, for without effective financial management, few systems will have sufficient resources to hire the best personnel, or invest in the most efficient infrastructure.

Small drinking water systems, in particular, were targeted by the 1996 Amendments. The recommended path for sustainable financial management of small systems was the adoption of a "business approach" to management. Total water system costs would need to be carefully accounted for and water rates would need to provide sufficient revenues to cover these costs.

Water systems that use a business approach to management can take advantage of the performance assessment and improvement tools used by the business community. Benchmarking is one of the most useful tools, and is based upon the calculation and comparison of indicator measures that have a demonstrated relationship to financial performance.

Session Summary

- Small water systems must operate like a business
- Financial benchmarking is tool that can guide performance assessment
- Well established financial indicators are available
- Many published sources of financial measures
- Must turn measurement into *Action*

Performance assessment has been well-established in the drinking water sector. Many financial indicator measures are readily available in published sources that can be quickly applied to water system financial analysis and benchmarking. *External benchmarking* is the most thorough form of performance assessment and provides the greatest potential for improvement. The comparison of indicator measures provides a means of identifying the *best-in-class* performers in a select peer group of water systems. The *best practices* used by these systems to achieve superior performance can then be identified and used by other system managers to improve their own performance.

The goal of benchmarking is to improve performance. Measurement alone is not enough. Comparative measurement and identification of best practices must be used to develop and implement action plans to improve water system performance.

Session 3 Exercises

Exercise 3A.

Purpose

The purpose of this exercise is to discuss the identification and development of performance indicators in water system operating data.

Part 1. ***Performance Indicators*** Using the ***Water System Characteristics Data Sheet***, from Session 2, identify those columns that contain data that can be used to assess water system "performance". List one or more system characteristics that you think are measures of performance:

Performance Measures

1. _____
2. _____
3. _____
4. _____

Part 2. ***Benchmarks*** For each of the measures identified in part one, identify a "benchmark value" that you think is appropriate, and be prepared to provide the reason(s) that justify your choice.

	Appropriate Value	***Justification***
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____

Part 3. ***Best-in-class*** Based upon the indicators and benchmarks identified above, identify the best system (or systems) among two classes of water systems, those that serve 500 persons or less and those that serve more than 500 people.

Best system(s) serving 500 people or less

_____ _____ Why? _____

Best system(s) serving more than 500 people

_____ _____ Why? _____

Exercise 3B.

Purpose

The purpose of this exercise is to discuss the identification and development of financial performance indicators in water system financial data.

Using the ***Water System Financial Data Sheet*** and the ***Water System Characteristics Data Sheet***, suggest several measures that can be used as indicators of financial performance.

Financial Indicator Measures

1. _____
2. _____
3. _____
4. _____
5. _____

Comparison Methods

From the list above, select one "logical" indicator measure – that is, a measure that is useful because it relates to basic business requirements:

_____

Select one "time-series" indicator measure – that is, a measure that is useful for your water system to track over time:

_____

Select one "external" or "peer group" indicator measure – that is, a measure that is useful because it provides you with a comparative baseline that you can use to assess your water system's performance:

_____

Water System Financial Data Sheet

ID Code	Residential Cost at 6kgal per month ($/month)	Sales Revenue ($/year)	Non-Sales Revenue ($/year)	Total Revenue ($/year)	Operating Expense ($/year)	Debt Service ($/year)	Total Expense ($/year)	Net Revenue ($/year)	Total Debt
182	26.00	10,454	606	11,060	7,511	0	7,511	3,549	0
322	7.00	2,473	383	2,856	7,895	1,321	9,216	-6,360	4,537
168	19.75	9,425	75	9,500	5,315	3,994	9,309	191	64,200
76	51.00	29,764	760	30,524	27,242	0	27,242	3,282	0
247	32.00	17,893	1,721	19,614	7,968	0	7,968	11,646	0
4	14.18	61,320	11,447	72,767	87,702	0	87,702	-14,935	0
339	14.50	1,244	0	1,244	2,780	0	2,780	-1,536	0
185	21.30	45,643	20,109	65,752	50,876	18,100	68,976	-3,224	65,000
196	38.00	31,089	1,864	32,953	23,700	5,400	29,100	3,853	16,000
213	37.25	27,685	541	28,226	23,200	5,955	29,155	-929	70,117
278	35.70	43,885	2,104	45,989	56,912	11,858	68,770	-22,781	116,000
293	52.70	38,670	2,027	40,697	44,065	3,756	47,821	-7,124	39,202
176	23.30	48,143	2,371	50,514	54,731	*missing*	54,731	-4,217	*missing*
281	9.00	29,420	10,596	40,016	16,720	7,000	23,720	16,296	161,000
142	43.00	279,645	45,776	325,421	208,593	*missing*	208,593	116,828	*missing*
101	13.76	45,838	33,361	79,199	47,756	26,944	74,700	4,499	136,000
89	42.17	164,917	2,457	167,374	130,205	0	130,205	37,169	0
208	55.51	148,036	17,324	165,360	171,611	45,289	216,900	-51,540	514,000
309	10.80	95,286	1,594	96,880	113,322	0	113,322	-16,442	0
202	28.50	132,079	9,898	141,977	110,894	20,100	130,994	10,983	138,000
252	27.00	148,160	61,222	209,382	98,840	39,600	138,440	70,942	70,000
78	39.70	185,000	6,000	191,000	185,000	*missing*	185,000	6,000	*missing*
195	24.23	141,958	1,946	143,904	172,239	4,931	177,170	-33,266	80,795
238	47.60	295,472	20,800	316,272	311,630	300,150	611,780	-295,508	2,500,788
312	20.20	105,477	3,032	108,509	128,255	37,620	165,875	-57,366	110,000
114	53.55	703,730	140,077	843,807	450,688	133,725	584,413	259,394	1,240,000
303	38.50	216,000	3,600	219,600	94,000	85,000	179,000	40,600	1,880,000
321	18.00	160,000	4,000	164,000	79,500	82,000	161,500	2,500	2,100,000
96	25.99	243,817	15,776	259,593	210,031	0	210,031	49,562	0
225	17.30	143,400	81,950	225,350	120,200	94,200	214,400	10,950	4,308,000
194	26.80	241,155	40,932	282,087	349,127	0	349,127	-67,040	0
150	32.46	510,221	60,964	571,185	145,650	243,702	389,352	181,833	2,990,000
80	33.77	512,800	14,883	527,683	325,000	140,000	465,000	62,683	878,000
1	4.67	278,000	326,624	604,624	240,859	347,306	588,165	16,459	4,718,540

Session 4

Financial Benchmarking Practice

Working with data, performance measures, benchmarks, and action plans

"Just measuring something doesn't improve it

Richard Fisher
An Overview of Performance Measurement

This session uses a case study exercise to demonstrate how the information presented in the previous sessions might be applied to conduct financial benchmarking at a small drinking water system.

Session 4
Objectives

- Present a step-by-step demonstration of a hypothetical benchmarking process
- Review information from previous Sessions

The case study presented here uses very basic indicator measures and analyses to illustrate the benchmarking process. It is likely that most drinking water systems will require more detailed indicators to address specific problems at their own water systems.

This exercise uses a sample of actual demographic, financial, and operational information collected from the 350 water systems that participated in the survey phase of the *Benchmark Investigation of Small Public Water System Economics*. This study is described in the *Resources Guide*; a complete copy of the study (in PDF format) is also included on the CD-ROM that accompanies this workbook.

The water system described in this case study is a small community water system in the Midwest that is referred to by the identification code assigned to the system during the *Benchmark Investigation* (System 176). The financial, operation, and management information provided by this system were used to create a fictitious scenario that is used to demonstrate a hypothetical benchmarking analysis.

Data from 33 other systems that participated in the study are also included. These systems serve as the benchmarking peer group for this case study. These systems are also identified by their System ID Code from the *Benchmark Investigation*.

The case study begins with a description of the water system and the scenario that led it to engage in the benchmarking process. The rest of the session follows the actions of the system managers and benchmarking team as they work through the steps of the benchmarking process. It may be helpful to review the benchmarking process before beginning the exercise. As presented in this workshop, the benchmarking process consists of seven steps:

Before you start *(minimum process check)*

1. Select process or function to investigate
2. Identify suitable performance measures
3. Select comparison method
4. Collect the "data"
5. Analyze data and present findings
6. Initiate performance improvement program
7. Recalibrate benchmarks *(Repeat process ...)*

System Description and Benchmarking Scenario

System 176 is a municipal water system that was started in 1927. It currently has 225 connections and serves an estimated population of 394 people. About 10% (25) of the connections serve commercial and industrial establishments. The system maintains approximately 6.5 miles of transmission and distribution line. There have been no maximum contaminant level or monitoring violations in the past 3 years and the systems has not needed to issue a single boil water order in the past year.

Water for the community comes from a surface water source. The water system has 2 full-time employees and 100% of the systems connections are metered. Customers who are connected to the system pay $23.30/month for 6,000 gallons of water. Total annual production for the system is 11,038,000 gallons. The system has no outstanding loans or any other form of debt.

Case Study

SYSTEM CHARACTERISTICS (2000)
System ID Code: 176

Population Served		394	persons
Annual Water Production		11,038,000	gallons
Total number of Connections		225	connections
Residential	200		
Comm/Ind	25		
Length of T & D		6.5	miles
Monthly water price		$23.30	6,000 gallons
Number of employees		2	full-time

System 176 maintains several different types of financial records, including an income statement and balance sheet. System managers prepare an annual budget, "year-to-date" assessments, and monthly financial reports. These records are available for all of the years the system has been in operation. The village also maintains detailed demographic information about the community that they use in promotional brochures and grant applications.

Future priorities of system management include increasing water rates, installing new water treatment technologies, selling wholesale water to nearby communities and

locating sources of funding assistance. The water system treatment processes include pre-disinfection, flocculation/coagulation, filtration, post-disinfection, and corrosion control.

In the year 2000, the town council decided to seek funding assistance in order to upgrade the existing water treatment facility. As the first step in that process, the water system manager was ordered to prepare an assessment of current water system finances, and to identify those areas of system financial performance that were in need of attention. The council wanted to be sure that any problems with the system would be identified and resolved prior to beginning the search for financial assistance. System staff had already identified the *Drinking Water Revolving Loan Fund* as a potential source of low-interest loans, and had discussed the application process with State officials.

All the members of the town council and the water system staff were enthusiastic about the review of water system finances and anxious to demonstrate the good financial standing of their system in order to be competitive in their application for funding assistance. The town council voted to support the investigation, if necessary, with funds from the town's general revenues, and to provide manpower assistance from the municipal support staff.

Using the Benchmarking Process

Before you begin…

- Need good records
  - Financial records
  - Operational records
  - Documents of past improvement activities
  - Community records
- Need commitment to change

System 176 seems to have met all of the recommended preconditions for the benchmarking process. The system appears to have very good record keeping practices, with monthly, annual, and historical financial records available.

Other community records (business profiles, employment, income, age distribution, etc.) are also readily available.

Political leaders, water customers, and the water system staff are all committed to the assessment process and the improvement of the system. The next step in the benchmark process is the selection of financial function that will be investigated.

In preparation for financial assessment, water system staff members have downloaded a copy of the *Ratio8* financial assessment tool. *Ratio8* identifies three principal financial functions:

- Revenue sufficiency
- Credit worthiness
- Fiscal management and controls

The first, and perhaps foremost, financial function is *revenue sufficiency*. It is the foundation of water system finances. The staff members of System 176 selected this function as the place to begin the investigation of the financial health of their water system.

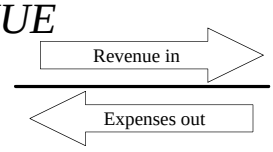
Various measures of revenue sufficiency are used in business assessment, to analyze specific income streams and business requirements (such as *operating ratio*). However, the most basic measure is *net revenue.*

Step 1.
Select function to investigate
(*WHAT* to benchmark)

Financial functions…
- *Revenue sufficiency*
- Credit worthiness
- Fiscal management and controls

Step 2.
Identify performance measure

NET REVENUE



Net Rev = TR - TE
where:
TR = Total Revenues from all sources
TE = Total Expenses

This indicator measure is calculated by subtracting the *total annual expenses* for the system from *total annual revenues* generated by water sales, connections fees, fines, interest on savings, and all other sources. *Net revenue* measures whether the water system collected enough revenues over the course of the year to cover all of its expenses.

Because this was the first benchmarking experience for the members of the System 176 staff, they decided to start with this basic measure of water system performance, and to then select other appropriate measures as the analysis proceeded.

The third step in the benchmark process is to choose the appropriate method of comparisons to use.

A business that is unable to at least cover all of its expenses will soon go out of business. Therefore the *logical* minimum performance level for *net revenue* is zero (0). While there may be some reasons why a water system might temporarily wish to operate with negative net revenues, such situations are exceptions, and cannot continue for extended periods of time. This was the initial comparison method selected by the System 176 team.

Step 3.
Select comparison method

LOGICAL
– Net Rev MUST *at least* equal zero (0)

TIME SERIES
- Could track changes over time

EXTERNAL
- Comparisons are not very useful

Time series or *internal* comparisons of *net revenue* might also be useful in tracking the influence of changes in water rates or rate structures, or increases in the costs of fuel or chemicals used in water treatment.

External comparisons of *net revenues* to other water systems are not likely to be very useful. The specific value of *net revenues* can be influenced by ownership type, state regulations, the operating philosophy of system managers, or many other factors. For example, not-for-profit systems may prefer to operate so that their *net revenue* is as close to zero as possible.

Step 4.
Collect the "data"

- Systems collect many types of financial data
- Revenue/expense data is most basic
- Level of detail increases with system complexity

Step 4 of the benchmarking process is to collect the information that will be used to derive performance measures. As discussed in the exercise in Session 2, water systems collect many types of financial data, and all businesses should have some method of keeping track of revenues and expenses.

One common tool for tracking water system expenses is a simple "Chart of Accounts". Numerous simple computerized accounting systems are now available for small water systems that ease the burden of record keeping and can create electronic versions of the Chart of Accounts. Not only do these tools facilitate the detailed collection of information needed for benchmarking analysis, but many also produce standard financial reports, charts, and graphs.

Chart of Accounts

Acct #		Account Name	$ Amt
1000		**Assets**	0
	1100	Current Assets	0
	1110	Cash	0
	1120	A/R	0
	1130	Inventories	0
	1140	Prepaid Expenses	0
	1200	Property, Plant & Equipment	0
	1210	Land	0
	1220	Buildings	0
	1230	Utility System	0
	1240	Construction Work in Progress	0
	1250	Equipment	0
2000		**Liabilities**	0
	2100	Current Liabilities	0
	2110	A/P	0
	2120	Payroll taxes payable	0
	2130	Accrued interest payable	0
	2140	Notes payable	0
	2200	Long-Term Debt	0
3000		**Equity**	0
	3100	Retained Earnings	0
	3200	Other	0
4000		**Water Utility Operating Revenues**	0
	4100	Fees & Service	0
	4110	Hook-up fees	0
	4120	Other	0
	4200	Residential	0
	4300	Commercial	0
	4400	School District	0
	4500	Contractual	0
	4600	Other	0
5000		**Water Utility Non-Operating Revenues**	0
	5100	Interest income	0
	5200	Gain on sale of assets	0
	5300	Transfers	0
	5310	Interfund	0
	5320	Intergovernmental	0
	5321	State	0
	5322	Federal	0
	5400	Other	0

Village Population	

Acct #		Account Name	$ Amt
6000		**Water Utility Operating Expenses**	0
	6100	Personnel	0
	6110	Salaries	0
	6120	Stipends	0
	6130	Payroll taxes payable	0
	6140	Workers compensation	0
	6150	Retirement/Pension	0
	6160	Non-retirement benefits	0
	6170	Certifications	0
	6180	Other	0
	6200	Travel	0
	6210	Airfare	0
	6220	Ground Transportation	0
	6230	Per Diem	0
	6240	Training Workshops	0
	6250	Other	0
	6300	Facilities	0
	6310	Telephone	0
	6320	Rent	0
	6330	Electricity	0
	6340	Water & Sewer	0
	6350	Fuel oil	0
	6360	Repairs/Maintenance Bldgs	0
	6370	Other	0
	6400	Equipment	0
	6410	Materials	0
	6420	Supplies	0
	6430	Parts	0
	6500	Other	0
	6510	Interest & late charges	0
	6520	Insurance & bonding	0
	6530	Member dues & subscriptions	0
	6540	Bank charges	0
	6550	Audit/Accounting/Legal	0
7000		**General & Administrative**	0
	7100	Contractual	0
	7310	Capital improvements	0
	7320	Other	0
	7200	Engineering and Professional services	0
	7300	Supplies	0
	7310	Office & clerical	0
	7320	Postage	0
	7330	Copier	0
	7340	Chemicals	0
	7350	Water testing	0
	7360	Other	0
8000		**Water Utility Non-Operating Expenses**	0
	8100	Capital/Special Projects Expenses	0
	8110	State Funded	0
	8120	Federal Funded	0
	8130	Own Source	0

The *Ratio8* financial assessment tool contains a spreadsheet version of a standard chart of accounts. This chart of accounts provides users with a detailed set of categories that can be used to record and store specific information about water system revenues, expenses, and other financial information.

Ratio8 also allows users to enter the service population for the system so that various indicator measures based on population (i.e., revenue/person) can be calculated.

Although the staff members of System 176 had their own accounting systems in place they were familiar with the *Ratio8* software tool, and used it to record and review financial data from their system.

Having selected the financial function to examine, identified an appropriate indicator measure, and collected and reviewed the data, the benchmarking team from System 176 was now prepared to begin the analysis.

The analysis process begins with an initial review of the data and comparison of indicators measures to reveal performance gaps. If performance gaps are found, the next step is to identify practices that can help to improve the level of performance. Finally, the analysis and recommendations of improved practices are shared with community leaders and the public.

Step 5
Analyze the data and present findings

- Do the numbers make sense
- Compare performance indicators
- Determine performance gaps
- Search for best practices
- Communicate information

Revenue analysis procedure

- Calculate Net Revenue
  - Make "logical" (profit/loss) comparison
- Determine results
  - Expenses too high? Revenues too low? Both?
- Evaluation of Revenues
  - Select performance measure for revenues
  - Select source of comparison
  - Compare to benchmark value
- Repeat for Expenses

The *net revenue* indicator measure has two component parts: *total annual revenues* and *total annual expenses*. The System 176 team decided on a comparison process that would first determine the value of the net revenues for the system. If revenues are greater than zero (0), then they would need to examine the implications of positive net revenues. They would look for other comparative measures that would help them to determine *the proper level of positive revenues.*

If net revenue were equal to zero (0), then the team would need to examine *the implications of zero net revenue*, and what actions (if any) should be taken. However, if net revenues were less than zero (0), then the system would have failed to achieve the minimum level of financial performance, based on the *net revenue* indicator measure. The System 176 team would then need to determine whether this is the result of insufficient revenues, excessive costs, or both. Other indicator measures would need to be selected to guide this more detailed analysis.

NET REVENUE WORKSHEET
Annual Revenues
System ID Code: 176

REVENUES		
User Service Charges		$ 48,143
Residential Accounts	$ 43,686	
Commercial	$ 4,074	
Industrial	$ 383	
Wholesale	0	
Other	0	
Connection Charges		$ 1,142
Service Charges		$ 336
Interest Earnings		$ 45
Other Revenues		$ 848
TOTAL REVENUES		

The System 176 team first assembled all of the information needed to examine their *total annual revenues* from the previous year.

The bulk of the revenues for their system came from its residential accounts. A small amount of revenues were also obtained from connection and services charges, and the system has some investments that are returning a small amount of interest (itemized under the category of "Other Revenues").

NET REVENUE WORKSHEET
Annual Expenses
System ID Code: 176

EXPENSES		
Salaries, Wages, Benefits		$ 26,946
Administration (office utilities, supplies, phone, etc.)		$ 343
Operating Utilities (electricity, gas, oil, etc.)		$ 15,008
Insurance		$ 1,100
Purchased Water		0
Chemicals		$ 4,851
Other Operating Supplies (tools, pipes, parts, etc.)		
Contract Services		$ 999
Engineering	0	
Accounting/Auditing	$ 850	
Water Testing/Reporting	0	
Billing	0	
System Repairs	$ 149	
Legal Services	0	
Other Contract Services	0	
Taxes (excluding payroll)		$ 3,121
Depreciation		
Other		$ 2,363
Debt Service		0
Interest Payments	0	
Principal Payments	0	
Reserve Fund Contribution		0
TOTAL EXPENSES		

The benchmarking team next assembled the data needed to calculate the system's *total annual expenses.*

The majority of the expenditures for their system (and most water systems) were allocated to staff salaries and benefits. A significant portion of the total expenses for the system also was allocated to utilities and taxes. The unusually high values for these two expense categories caused the benchmarking team to go back and double-check the records that had been used to collect the data and to be sure that these values were properly calculated and entered into the worksheet.

The next step in the process was to calculate the net revenue. The *total annual revenues* for System 176 (in the year 2000) from the User, Connection, and Service Charges and the Interest and Other Revenues was $50,514. *Total annual expenses* from all categories summed to $54,731.

Net Revenue Calculation

TOTAL REVENUES	**$ 50,514**
MINUS	
TOTAL EXPENSES	**$ 54,731**
EQUALS	
NET REVENUES	

When expenses were subtracted from revenues it was found that the net revenue for System 176 was a -$4,217, indicating that the system had failed the most basic financial test and had lost a significant amount of money. (While it may seem surprising that this system was operating at a loss, it should be noted that more than 30% of the water systems that participated in the *Benchmark Investigation* also reported negative or zero revenues.)

The System 176 team was surprised by this result, and several members used this result to argue that this only provided further evidence of the need for a rate increase at the systems. However, other members of the team reminded them that they still needed to proceed with the next step in their plan to evaluate performance, and to try and determine if revenues were inadequate, or if expenses were excessive, or both.

To do this they decided that they would now need to shift to *external benchmarking*. They would identify appropriate performance indicators for annual revenues and expenses, calculate these, and then compare these to the values of other similar water systems.

Performance measures: Revenues

Revenues Per Connection, 1,000 gallons (kgal), and Person Served

Total revenues per person served

Total Revenues		$ 50,514
	Divided by	
Population Served		394
	Equals	
Total Revenue per person		

Total revenues per 1,000 gallons produced

Total Revenues		$ 50,514
	Divided by	
Annual Water Production in Kgal		11,038
	Equals	
Total Revenue per 1,000 gallon produced		

Total revenues per connection

Total Revenues		$ 50,514
	Divided by	
Total Connections		225
	Equals	
Total Revenue per connection		

The team decided that if they were going to make comparison to other water systems it might be best to select performance measures that "normalize" basic water systems data by dividing operational or financial data by common water system characteristics, such as population or output volume. These "ratios" make it possible to compare water systems of various sizes.

Several commonly used performance measures were available, including: revenues per connection, revenues per 1,000 gallons delivered, and revenues per person served. Using the data available from their operational and financial reports, the team calculated each of these revenue measures for their system.

The next step was to use one or more of these indicator measures to assess the adequacy of the annual revenues from System 176 by examining comparative revenue measures from similar systems. This required finding or collecting revenue data from a sample of other small drinking water systems.

Fortunately, System 176 had just participated in a benchmarking study of small drinking water system economics sponsored by the *Midwest Technical Assistance Center*. Each system that participated in the study had received a copy of final project report. This document included numerous tables of financial data collected from small drinking water systems in ten Midwestern states. (Note: a copy of the final project report for the *Benchmark Investigation of Small Public Water System Economics* is included on the CDROM that accompanies this workbook).

Benchmark Comparison: Revenues

REVENUE INDICATOR MEASURES
System ID Code: 176

Total revenues per person served	$ 128.21
Total revenues per 1,000 gallons produced	$ 4.58
Total revenues per connection	$ 224.51

Table VI-17. Total Revenue per 1, 000 Gallons Delivered, Per Connection, and per Person Served

Statistic	*Total revenue per 1,000 gallons*	*Total revenue per connection ($/conn)*	*Total revenue per person served ($/person)*
Mean	$ 4.80	$ 325.00	$ 151.00
Median	$ 4.26	$ 290.00	$ 125.00
No. of obs.	*140*	*191*	*201*

TableVI-19. Distribution of Total Revenues Per 1,000 Gallons by Source Water Type

Statistic	*Ground*	*Surface*	*Purchased*
Mean	$ 3.78	$ 4.60	$ 6.81
Median	$ 3.20	$ 4.59	$ 6.58
# of obs	*65*	*31*	*43*

The benchmarking team prepared a worksheet that included the calculated values of the three indicator measures from System 176, along with several tables from the study that reported various revenue measures. Both tables contain means (averages) and medians (the middle most values in a set of data) calculated for particular subsets of data. The number of observations (systems) differs for each statistic because not all systems provided all of the data that was requested.

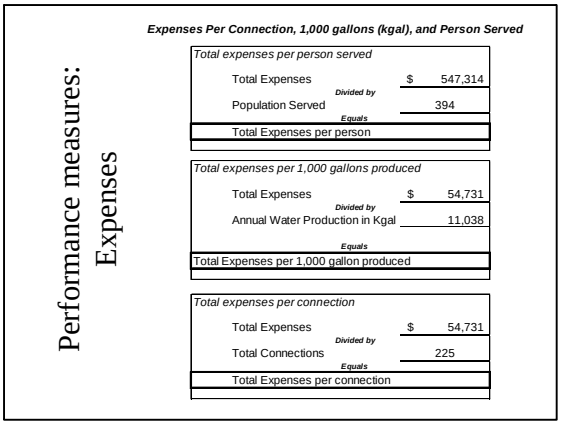
The team members realized that while these measures of central tendency (mean and median) were not benchmarks per se (they did not tell them what these values "should"

be for a system with their particular characteristics), they would be able to see where System 176 fit into a range of values from similar systems.

The performance measure that they selected was *total revenue per 1,000 gallons* of water delivered. This measure was available for a large number of the systems in study, and was also had also been calculated for each type of water source. The benchmarking team was well aware of the additional expenses that are involved in operation of a surface water system and interested in including this comparison. The team also decided to use the median value to make comparisons, because they were aware how mean values can be easily skewed by a few very high or low values.

The peer group comparison found that the median, *total revenue per 1,000* gallons for System 176 ($4.58) was slightly larger (better) than the median value estimated from the 140 responses to the *Benchmark Investigation* ($4.26). The comparative value from the 31 surface water systems in the study ($4.59) almost exactly matches that of System 176, which is a surface water system

On the basis of these comparisons, the benchmarking team concluded that System 176's revenue situation appears to be reasonably adequate. They therefore decided to repeat this process and assess their system's expenses.



The expenditure performance measures were calculated in the same way as the revenue measures and compared to similar tables of expense measures from systems participating in the *Benchmark Investigation.*

Systems 176's *expenses per 1,000 gallons* are much higher than the median value of the 155 systems that provided enough information to calculate this measure in the *Benchmark Investigation* (Table VI-17).

Benchmark Comparison:
Expenses

EXPENSE INDICATOR MEASURES
System ID Code: 176

Total expenses per person served	$ 138.91
Total expenses per 1,000 gallons produced	$ 4.96
Total expenses per connection	$ 243.25

Table VI-17. Total Expenses per 1, 000 Gallons Delivered, Per Connection, and per Person Served

Statistic	*Total expenses per 1,000 gallons ($/gal)*	*Total expenses per connection ($/conn)*	*Total expenses per person served ($/person)*
Mean	$ 4.13	$ 293.00	$ 126.00
Median	$ 3.47	$ 230.00	$ 99.00
No. of obs.	*155*	*254*	*274*

TableVI-19. Distribution of Total Expenses Per 1,000 Gallons by Source Water Type

Statistic	*Ground*	*Surface*	*Purchased*
Mean	$ 3.12	$ 4.05	$ 5.78
Median	$ 2.45	$ 4.38	$ 5.31
# of obs	*75*	*33*	*46*

However, expenses for surface water systems are expected to be higher than for groundwater systems, which made the majority of the 155 systems included in the calculation of median total expenses per 1,000 gallons. But when only surface water systems are considered (Table VI-19), System 176 is still nearly 60 cents per gallon higher (13%).

Prior to beginning the benchmarking study, the management of System 176 had felt that the system was badly in need of a rate increase. The benchmarking team was therefore surprised to find that the evidence that they had collected so far pointed expenditures as the most serious problem facing the system. They decided to continue on with the assessment process to see if they could identify one or more particular expense categories that were performing especially poorly and dragging down the overall expense performance of the system.

Upon further investigation, they found that the *Benchmark Investigation* had provided an analysis of water system expenses per connection, with sub-categories for both surface water and ground water systems. The System 176 team prepared another worksheet to calculate the individual expenses per connection for each of the expense categories for which they had data.

Performance Measure: Expense Per Connection

EXPENSE PER CONNECTION WORKSHEET
System ID Code: 176

TOTAL NUMBER OF CONNECTIONS		225	
			Expense per connection
EXPENSES			
Salaries, Wages, Benefits		$ 26,946	$ 119.76
Administration (office utilities, supplies, phone, etc.)		$ 343	$ 1.52
Operating Utilities (electricity, gas, oil, etc.)		$ 15,008	$ 66.70
Insurance		$ 1,100	$ 4.89
Purchased Water		0	$ -
Chemicals		$ 4,851	$ 21.56
Other Operating Supplies (tools, pipes, parts, etc.)		0	$ -
Contract Services		$ 999	$ 4.44
Taxes (excluding payroll)		$ 3,121	$ 13.87
Depreciation		0	$ -
Other		$ 2,363	$ 10.50
Debt Service		0	$ -
Interest Payments	0		
Principal Payments	0		
Reserve Fund Contribution		0	$ -
TOTAL EXPENSES		54,731	$ 243.25

Benchmark Comparison:
Expense Per Connection

EXPENSE PER CONNECTION COMPARISON SHEET
***B.I.* Public Systems vs. System ID Code: 176**

Expense per connection	*Benchmark Investigation* Ground water (medians)	*Benchmark Investigation* Surface water (medians)	*System 176*
Salaries, Wages, Benefits	$ 46.89	$ 102.87	$ 119.76
Administration (office utilities, supplies, phone, etc.)	$ 5.56	$ 9.06	$ 1.52
Operating Utilities (electricity, gas, oil, etc.)	$ 16.67	$ 20.66	$ 66.70
Insurance	$ 4.90	$ 20.67	$ 4.89
Purchased Water	$ 14.87	$ 82.52	0
Chemicals	$ 5.61	$ 23.84	$ 21.56
Other Operating Supplies (tools, pipes, parts, etc.)	$ 15.40	$ 23.48	0
Contract Services	$ 10.00	$ 5.45	$ 4.44
Taxes (excluding payroll)	$ 0.55	$ 3.01	$ 13.87
Depreciation	$ 31.58	$ 5.33	0
Other	n/a	n/a	$ 10.50

The expenses for System 176 matched the medians from the 33 surface water systems in the *Benchmarking Investigation* reasonably well in several categories. However, expenses per connection for System 176 were more than triple the median values in the categories of *Operating Utilities* and *Insurance.*

The category that concerned the team most was the utility expenditures which were second only to salaries, wages and benefits. The benchmarking team did a quick review of the characteristics of their system (see *Water System Characteristics Data Sheet* from Session 2) to see if there were any obvious reasons (such as an unusually large number of miles of transmission and distribution lines) for the large difference in utility costs.

The team decided that they needed to carry the benchmarking process one step further and try to determine the practices that were being used by other similar systems that allowed them to have much lower utility expenses per connection. To do this they would need to select a peer group of systems, identify those who were the best-in-class for utility expenses, and then contact these systems to learn the practices they used to achieve these lower utility expenses.

As part of their participation in the *Benchmark Investigation*, System 176 had agreed to make its water system data publicly available, and volunteered to cooperate with other

small systems that were conducting benchmark studies. The System 176 team contacted the researchers who had conducted the study and requested the data and contact information of other participating systems who had also signed on to this agreement. They also requested information on the expenses per connection of each of these systems.

In response to their request, the System 176 benchmarking team received a table from the researchers that included the expenses per connection data for 34 small systems. The table also included data on the source of water population served, and number of connections for each system. The team members decided that they would use this table to select a peer group that they could use to compare the expense performance of their system. From these comparable systems they would the try to identify a list of the *best-in-class* performers.

Identify peer group for comparison

ID Code	Source water	Cost per Connection ($)										Pop. served	Total Conn.
		Salaries	Admin.	Utilities	Insurance	Water Purchases	Chemicals	Supplies	Contacted Services	Taxes	Deprec.		
182	GW	0.00	14.29	50.00	10.52		0.00	0.00	282.86	0.00		21	21
322	GW	15.37		13.00				258.56	0.00	0.00		81	27
168	GW	13.04	3.92	52.94	0.00		3.92	19.61	7.84	2.94		82	51
76	Purchased	83.72	5.81	3.49	0.87	167.81	0.00	0.35	40.70	5.35	0.00	100	86
247	Purchased	0.00	2.27	17.57	5.41	57.43	0.66	0.00	53.55	0.00	0.00	125	56
4	Purchased	34.88	1.88	4.99	4.79	187.01	3.28		0.00	408.04		128	136
339	GW	22.22	0.74	4.44	14.81		9.26					145	54
185	GW	221.30	25.53	19.68	18.12			48.37	9.79	0.55	147.91	200	97
196	Purchased	12.02	4.22	2.16	0.44	124.23		16.14	22.70	1.09		200	100
213	Purchased	63.43	1.26		5.14	126.69		37.82				200	60
278	SW	162.38	7.05	**19.38**	15.60		145.57		0.00	0.00	0.00	278	141
293	Purchased	55.66	11.41	24.39	7.49	181.03		9.89	12.75	3.84	37.80	325	126
176	SW	120.29	1.53	**67.00**	4.91		21.66		4.46	13.93		396	225
281	GW	27.35	6.61	9.33	3.46			12.33				400	283
142	Purchased	87.71	6.64	22.25	2.37	135.86		71.48	3.01	5.80	96.70	481	481
101	GW	80.10	4.16	5.81	3.57			22.21	7.88	46.82		761	280
89	Purchased	28.75	3.21	15.94	0.00	104.57	7.81	20.31	0.00	12.68	0.00	850	415
208	SW	104.31	10.91	**20.68**	11.67	127.85	17.89	35.64	0.00	19.54	114.64	900	350
309	GW	44.30	9.87	13.18	19.50			25.39	16.76		23.74	983	561
202	SW	91.90	3.44	**13.77**			32.94	8.40	35.01		10.66	996	563
252	Purchased		15.58	6.28	9.07	62.79			82.56		53.58	1,000	420
78	SW	245.54	4.46	**22.32**	22.32		33.48	37.95	2.23			1,100	448
195	Purchased	37.23	4.83	0.00	5.06	128.41	0.00	6.09	115.35	14.00	0.00	1,100	538
238	GW	94.97	27.00	55.38	10.18	14.60	29.75	29.75	19.45	89.24	342.79	1,300	437
312	GW	52.91	8.62	35.57	3.93		9.32	10.61	1.63		45.01	1,326	637
114	SW	260.25	24.41	**52.29**	34.84		67.24	42.03	47.07	22.49	169.33	1,500	626
303	SW	4.17		20.83	5.56		4.17		50.00			1,700	720
321	GW	93.46	7.48	7.48	22.43		8.41	9.35	0.00	0.00	0.00	1,700	535
96	SW	107.00		1.76	5.56		16.21	55.45	6.48	2.02		1,850	1080
225	SW	81.43	5.89	22.86	12.50			29.46	26.07		36.43	2,000	560
194	Purchased	75.43	6.67	10.49	7.07	113.82	0.38	29.83	64.53		64.94	2,781	927
150	SW	59.65	13.74	0.00	5.17		19.52	7.23	0.00	0.00	0.00	3,100	1383
80	SW	151.11	14.81	22.96	2.96		13.33	11.11	24.44	0.00	0.00	3,300	1350
1	GW	73.28	28.45	1.17	4.01			60.15	26.43	0.81		3,500	960

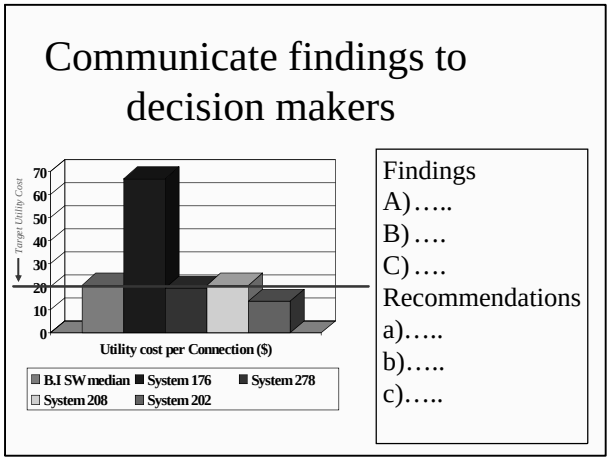
The first criterion that the team used was the source of water. Surface water systems, like System 176, have significantly different water treatment requirements than ground water systems, involving considerably larger energy costs. So only the nine surface water systems were included in the peer group.

Because of the economies of size that occur in water treatment, a second important criterion was that the systems in the peer group be of a similar number of connections to the 225 that are served System 176. All the systems that had between 141 and 626 connections were included. The selection process resulted in five other systems that use surface water *and* serve a reasonably similar number of connections.

The utility costs per connection (bold font in the "Utilities" column) for this peer group range from about $14 to $52. None of the systems in the peer group has a utility expense per connection as high as the $67 incurred by System 176.

The members of the benchmarking team identified three systems as best-in-class performers, Systems 202, 208, and 278. Each of these systems had utility costs below $21 per connection. Selected members of the benchmarking team contacted these utilities to discuss what practices they are following in order to minimize their utility expenses.

Once the information was been collected from their benchmarking partners it needed to be presented to decision makers and community members. Members of the team developed a presentation that provided details of the findings from their investigation, along with a series of recommendations for actions that could be included in a performance improvement plan for the utility.



Graphs and charts offer a compact way to present information to the decision makers and consumers who will need to participate in decisions regarding water system improvements. The benchmarking team members used the *Ratio8* software program to prepare a bar chart that showed how the utility cost per connection for System 176 (the largest bar) compared to the median cost of nine surface water systems from the *Benchmark Investigation*, and three *best-in-class* performers that were contacted for information on the practices that could be used to reduce utility costs down.

After the information collected during the benchmarking process was been presented and discussed, a plan of action was agreed upon by all parties and put in writing. This document was considered to be a "working" plan that could be altered if necessary in response to experiences gained during the process of working with the plan.

Step 6.
Initiate a performance improvement program

- Develop action plan
- Assign responsibilities for implementation
- Set performance goals and timelines

One utility staff member, a village board member and a volunteer from the community were assigned the task of implementing the performance improvement plan. The team was given the authority to sign off on purchasing and contracting agreements and provided with a small budget to use during implementation of the action plan.

A timeline was prepared for the implementation of the plan, and regular meeting scheduled for the implantation team to report to the village board.

The final step in the benchmarking process is to complete the circle of measurement and assessment, by monitoring changes in performance that result from the improvement program and continuously searching for other areas where improvements are possible.

The water utility staff members for System 176 agreed to carefully monitor water system expenses as the performance improvement plan was implanted, with the goal of lowering utility expenses to $20 or less per connection. Staff members also began plans to begin a new benchmarking study to continue their examination of utility expenses.

Step 7.
Recalibrate benchmarks

- Monitor performance improvement programs
- Re-evaluate over all performance
- Search for other avenues of performance improvement

Their next task was to explore, and if possible to reduce, the apparently high tax costs that were being charged to the systems. Longer range plans included an investigation of water utility salary and benefit expenses.

Session 4 Exercises

Exercise 4.

Purpose

The purpose of this exercise is to review expense and revenue sources and to practice calculating simple financial measures

Part 1. ***Net Revenue Calculations***
Using the ***Worksheet 4A*** calculate the *Total Revenue* and *Total Expenses* for Water System 176. Place your answers in the shaded boxes on the worksheet.

Use the results from Worksheet 4A to calculate the Net Revenues for this water system:

NET REVENUE CALCULATION

TOTAL REVENUES	
MINUS	
TOTAL EXPENSES	
EQUALS	
NET REVENUES	

Part 2. ***Financial Performance Measures***
Using ***Worksheet 4B***, calculate Revenue and Expenses per connection, per 1,000 gallon and per person served for System 176. Place your answers in the shaded boxes on the worksheet.

Part 3. ***Expense per Connection per Expense Category Measures***
Using ***Worksheet 4C***, calculate *expenses per connection* for each expense category and for *Total Expenses* for System 176. Place your answers in the shaded boxes on the worksheet.

Part 4. ***Identifying Peer Group Systems***
Using the ***Cost Per Connection Worksheet***, select a group of water system that can be used as a source of comparison for System 176. Write the system number below and the "Utilities" *cost per connection* for each system.

WORKSHEET 4A

NET REVENUE WORKSHEET
Annual Revenues/Expenses
System ID Code: 176

REVENUES		
User Service Charges		$ 48,143
Residential Accounts	$ 43,686	
Commercial	$ 4,074	
Industrial	$ 383	
Wholesale	0	
Other	0	
Connection Charges		$ 1,142
Service Charges		$ 336
Interest Earnings		$ 45
Other Revenues		$ 848
TOTAL REVENUES		
EXPENSES		
Salaries, Wages, Benefits		$ 26,946
Administration (office utilities, supplies, phone, etc.)		$ 343
Operating Utilities (electricity, gas, oil, etc.)		$ 15,008
Insurance		$ 1,100
Purchased Water		0
Chemicals		$ 4,851
Contract Services		$ 999
Engineering	0	
Accounting/Auditing	$ 850	
Water Testing/Reporting	0	
Billing	0	
System Repairs	$ 149	
Legal Services	0	
Other Contract Services	0	
Taxes (excluding payroll)		$ 3,121
Depreciation		
Other		$ 2,363
Debt Service		0
Interest Payments	0	
Principal Payments	0	
Reserve Fund Contribution		0
TOTAL EXPENSES		

WORKSHEET 4B

INDICATOR MEASURES WORKSHEET

Revenues/Expenses Per Connection, 1,000 gallons (kgal), and Person Served

System ID Code: 176

SYSTEM CHARACTERISTICS

Population Served		**394**	**persons**
Annual Water Production		**11,038,000**	**gallons**
Total number of Connections		**225**	**connections**
Residential	**200**		
Commercial	**25**		

TOTAL REVENUES **$ 50,514**

TOTAL EXPENSES **$ 54,731**

INDICATOR MEASURE CALCULATIONS

Total revenues per person served		*Total Expenses per person served*	
Total Revenues	$ 50,514	Total Expenses	$ 54,731
Divided by		***Divided by***	
Population Served	394	Population Served	394
Equals		***Equals***	
Total Revenue per person		Total Expenses per person	

Total revenues per 1,000 gallons produced		*Total Expenses per 1,000 gallons produced*	
Annual Water Production	11,038,000	Annual Water Production	11,038,000
Divided by	1,000	***Divided by***	1,000
Equals		***Equals***	
Annual Water Production in Kgal		Annual Water Production in Kgal	
Divided by		***Divided by***	
Total Expenses	$ 50,514	Total Expenses	$ 54,731
Divided by		***Equals***	
Annual Water Production (Kgal)		Annual Water Production (Kgal)	
Equals		***Equals***	
Total Revenue per Kgal Produced		Total Expenses per Kgal Produced	

Total revenues per connection		*Total Expenses per connection*	
Total Revenues	$ 50,514	Total Expenses	$ 54,731
Divided by		***Divided by***	
Total Connections	225	Total Connections	225
Equals		***Equals***	
Total Revenue per connection		Total Expenses per connection	

WORKSHEET 4C

EXPENSE PER CONNECTION WORKSHEET
System ID Code: 176

TOTAL NUMBER OF CONNECTIONS	225

EXPENSES			*Expense per connection*
Salaries, Wages, Benefits		$ 26,946	
Administration (office utilities, supplies, phone, etc.)		$ 343	
Operating Utilities (electricity, gas, oil, etc.)		$ 15,008	
Insurance		$ 1,100	
Purchased Water		0	
Chemicals		$ 4,851	
Other Operating Supplies (tools, pipes, parts, etc.)		0	
Contract Services		$ 999	
Taxes (excluding payroll)		$ 3,121	
Depreciation		0	
Other		$ 2,363	
Debt Service		0	
Interest Payments	0		
Principal Payments	0		
Reserve Fund Contribution		0	
TOTAL EXPENSES		54,731	

ID Code	Source water	Cost per Connection ($)										Pop. served	Total Conn.
		Salaries	Admin.	Utilities	Insurance	Water Purchases	Chemicals	Supplies	Contacted Services	Taxes	Deprec.		
182	GW	0.00	14.29	50.00	10.52		0.00	0.00	282.86	0.00		21	21
322	GW	15.37		13.00				258.56	0.00	0.00		81	27
168	GW	13.04	3.92	52.94	0.00		3.92	19.61	7.84	2.94		82	51
76	Purchased	83.72	5.81	3.49	0.87	167.81	0.00	0.35	40.70	5.35	0.00	100	86
247	Purchased	0.00	2.27	17.57	5.41	57.43	0.66	0.00	53.55	0.00	0.00	125	56
4	Purchased	34.88	1.88	4.99	4.79	187.01	3.28		0.00	408.04		128	136
339	GW	22.22	0.74	4.44	14.81		9.26					145	54
185	GW	221.30	25.53	19.68	18.12			48.37	9.79	0.55	147.91	200	97
196	Purchased	12.02	4.22	2.16	0.44	124.23		16.14	22.70	1.09		200	100
213	Purchased	63.43	1.26		5.14	126.69		37.82				200	99
278	SW	162.38	7.09	19.38	15.60		145.57		0.00	0.00	0.00	278	141
293	Purchased	55.66	11.41	24.39	7.49	181.03		9.89	12.75	3.84	37.80	325	128
176	SW	120.29	1.53	67.00	4.91		21.66		4.46	13.93		396	225
281	GW	27.35	6.61	9.33	3.46			12.33				400	283
142	Purchased	87.71	6.64	22.25	2.37	135.86		71.48	3.01	5.80	96.70	481	481
101	GW	80.10	4.16	5.81	3.57			22.21	7.88	46.82		761	280
89	Purchased	28.75	3.21	15.94	0.00	104.57	7.81	20.31	0.00	12.68	0.00	850	415
208	SW	104.31	10.91	20.68	11.67	127.85	17.89	35.64	0.00	19.54	114.64	900	350
309	GW	44.30	9.87	13.18	19.50			25.39	16.76		23.74	983	581
202	SW	91.90	3.44	13.77			32.94	8.40	35.01		10.66	996	563
252	Purchased		15.58	6.28	9.07	62.79			82.56		53.58	1,000	430
78	SW	245.54	4.46	22.32	22.32		33.48	37.95	2.23			1,100	448
195	Purchased	37.23	4.83	0.00	5.06	128.41	0.00	6.09	115.35	14.00	0.00	1,100	538
238	GW	94.97	27.00	55.38	10.18	14.60	29.75	29.75	19.45	89.24	342.79	1,300	437
312	GW	52.91	8.62	35.57	3.93		9.32	10.61	1.63		45.01	1,326	637
114	SW	260.25	24.41	52.29	34.84		67.24	42.03	47.07	22.49	169.33	1,500	626
303	GW	4.17		20.83	5.56		4.17		50.00			1,700	720
321	GW	93.46	7.48	7.48	22.43		8.41	9.35	0.00	0.00	0.00	1,700	535
96	SW	107.00		1.76	5.56		16.21	55.45	6.48	2.02		1,850	1080
225	GW	81.43	5.89	22.86	12.50			29.46	26.07		36.43	2,000	560
194	Purchased	75.43	6.67	10.49	7.07	113.82	0.38	29.83	64.53		64.94	2,781	927
150	SW	59.65	13.74	0.00	5.17		19.52	7.23	0.00	0.00	0.00	3,100	1383
80	SW	151.11	14.81	22.96	2.96		13.33	11.11	24.44	0.00	0.00	3,300	1350
1	GW	73.28	28.45	1.17	4.01			60.15	26.43	0.81		3,500	960

Appendix A.

Resources Guide for Small System Financial Management

Appendix A

Resources for Small System Financial Management

This appendix is included to provide readers with a tool to access to some of the many available books, research papers, training manuals and other materials related to benchmarking and the financial management of small drinking water systems. This appendix is divided into three sections.

Appendix A1 is a listing of published resources related to benchmarking in water utilities and other public sector enterprises. Some of these publications were reviewed and annotated as part of the *Benchmark Investigation*, and these annotations are reproduced here. These annotations provide readers with access to a summary the information contained in the original reports, which were sometimes expensive to purchase, or difficult to obtain. Several of these studies present comprehensive presentations of benchmarking analysis, and the approach presented in this workshop borrows heavily from these works. Appendix A1 also includes a list of a few of the many benchmarking web sites. Readers are cautioned that because of the transitory nature of internet websites, these websites, and all the electronic links provided in this resource guide, may be discontinued without warning.

Appendix A-2 presents a list of some of the sources of indicator measures and comparative data that can be used by water utilities to perform benchmarking comparisons. These resources are included in this appendix in order to demonstrate the widespread use of benchmarking, and to serve as an aid in the design of benchmarking comparisons by water system managers.

By design, the *Benchmarking Workshop* is intended to focus primarily on benchmarking techniques and how these can be applied to the financial management of small drinking water systems. Consequently, the workshop offers little assistance to community leaders interested in more comprehensive advice and training in water system financial management. Appendix A-3 is a list of some of the financial management training materials that have been developed for small water system managers. This appendix also provides some guidance on locating organizations that provide technical and financial assistance to small communities.

The resources included in this appendix are only a small sample of the many training materials and other resources that are available. Hopefully, this collection will provide guidance to the managers of small drinking water systems and they pursue the goal of improved water system performance.

Appendix A1.

Benchmarking Publications and Studies

In this section of the workbook we present brief summaries of a selection of publications that describe the application of benchmarking to public sector enterprises. Several of these publications specifically discuss financial benchmarking at small drinking water systems. These studies demonstrate the widespread application of benchmarking in the public sector and provide examples of water utility benchmarking and benchmark indicator values.

These summaries also provide examples of how government agencies and non-governmental organizations have promoted the expansion of benchmarking training and practice, as well as considerable information on how to implement benchmarking processes at water systems and other enterprises. The final section of the Appendix A also includes a list of web site resources dedicated to benchmarking.

Municipal Benchmarks: Assessing Local Performance and Establishing Community Standards

David N. Ammons
Sage Publications: Thousand Oaks. 2001 (first edition 1996)
Available from bookstores (*amazon.com* price of $65)

The intended audience of this book is "mayors, city council members, city managers, department heads, other municipal officials and citizens who want a measuring rod for local government services" (p.vii). The book presents a brief introduction to performance measurement and benchmarking and then offers a sample of benchmarks collected from the literature and municipal documents for 30 different municipal activities.

The introduction to the book provides a discussion of the rationale for using benchmarking as well as guidance on the design and use of benchmark measures. The author offers six reasons for measuring performance:

- accountability
- planning and budgeting
- program evaluation/measuring-by-objectives/performance appraisal
- reallocation of resources
- directing operations/contract monitoring

The basic guidance provided by performance assessment is straightforward: "unless you are keeping score, it is difficult to tell if you are winning or loosing." (p.11)

The author describes four different categories of performance measures:

1) Workload measures – amount of work performed or services received
2) Efficiency measures – relationship between work performed and resources required
3) Effectiveness measures – degree to which performance meets objectives
4) Productivity measures – combination of effectiveness and efficiency measures into a single indicator (p.12)

The choice of performance measures is critical to the success of any benchmarking effort. The author recommends the following criteria for the selection of indicator measures:

- Valid – measure what they claim to measure
- Reliable – can make repeated measures with little variation
- Understandable – unmistakably clear meaning
- Timely – can be compiled promptly enough to be useful to managers
- Resistant to efforts to "beat the system" through actions that do not truly represent desired changes

- Comprehensive – capture the most important performance dimensions
- Non-redundant – each measure contributes something distinctive
- Sensitive to data collection cost – inexpensive enough in collection and analysis to be practical
- Focused on controllable facets of performance – emphasize measures that can lead to immediate management action (p. 15)

The development of benchmark measures requires the analysis of data that are readily available, or can be collected with little effort. Several sources are suggested:

- Existing records
- Time logs
- Surveys
- Trained observer ratings
- Specially designed data collection processes (p. 16)

The author observes that members of any organization rarely welcome the development and use of performance measures. He suggests there are a variety of fears and motives within any organization that may lead to resistance. He predicts three types are likely to occur:

1) You can't measure what I do.
2) You're measuring the wrong thing.
3) It costs too much and we don't have the resources.

He cautions that no efforts should be made unless there is the support to carry them far enough so that they result in real improvements in the organization. (p. 20)

Performance measurement systems can be developed in a variety of ways. The author provides the following framework as a generic approach.

1) Secure managerial commitment
2) Assign responsibility for coordinating departmental efforts
3) Select departments/activities/functions for the development of performance measures
4) Identify goals and objectives
5) Design measures that reflect performance relevant to objectives
6) Determine the desired frequency of performance reporting
7) Assign departmental responsibility for data collection and reporting
8) Assign centralized responsibility for data receipt, monitoring and feedback
9) Audit performance data periodically
10) Ensure that analysis of performance measures incorporates a suitable basis for comparison
11) Ensure a meaningful connection between the performance measurement system and important decision processes
12) Continually refine performance measures
13) Incorporate selected measures into public reporting (p. 21)

One of the techniques most often used in performance improvement is benchmarking. The author defines benchmarking as the "anticipated or desired results anchored either in professional standards or in the experience of respected municipalities" (p.23). "True" benchmarking consists of four components:

1) the identification of best-in-class performers
2) the comparison of local performance outputs and results with those top performers
3) the analysis of practices that account for any performance gaps
4) the development and implementation of strategies to adjust performance in one's favor" (p.28, 1996 edition)

Two major issues are involved in the identification of suitable benchmarks. The first is to locate available data from other utilities that can be used for comparison. The second is the issue of comparability. The author cautions that practitioners must be "vigilant" in ensuring that measures that are selected are truly comparable.

The 1996 edition of the book contains an extensive list of suggested financial benchmark indicators for municipalities in the *Finance* chapter. The indicators suggested for municipal water enterprises are taken from Moody's *1988 Medians: Selected Indicators of Municipal Performance* (below):

Indicator for Water Enterprises	***1988 Median***	***Formula***
Operating Ratio	70.1%	Operating & maintenance expenses divided by total operating revenues
Net Take-Down	34%	Net revenues divided by gross revenue & income.
Interest Coverage	4.08	Net revenues divided by interest requirements for year.
Debt Service Coverage	2.18	Net revenues divided by annual principal & interest requirements.
Debt Service Safety Margin	23.6%	Net revenues less annual principal & interest requirements divided by gross revenue & income
Debt Ratio	33.1%	Net funded debt divided by the sum of net fixed assets plus net working capital.

The *Public Utilities* chapter of the book also contains a sample of two operating benchmarks for water utilities: average number of water failures per 1,000 miles of transmission and distribution lines, and percentage of unaccounted for water. These averages are grouped and presented by region, community size, population change (1970-1980), system size (in miles), and age of housing stock.

Guide to Financial Management Benchmarking

Financial Management Policy Division
Treasury Board of Canada Secretariat (TBS)
Available online at: *http://www.tbs-sct.gc.ca/pubs_pol/dcgpubs/TBM_133/gfmb1_e.html*
24 pages

"This Guide is generic and could apply to all benchmarking, but our focus is on benchmarking financial management functions (as illustrated by the example in the case study). The Guide was developed following a series of studies conducted by the firm PricewaterhouseCoopers under the direction of the Financial Management Policy Division of TBS. Part of the studies included consultations with representatives from TBS, departments who are members of the Comptrollership Council and other departments who agreed to participate in the projects. The Guide would provide departments and agencies, wishing to undertake financial management benchmarking, with information on how benchmarking of financial functions works, how it helps and what the benefits are."

"Benchmarking provides a useful tool that may be used to assist in the achievement of modern comptrollership by identifying ways to develop financial management capabilities and strengthen key financial management functions such as budgeting, forecasting, cost, financial and performance analyses."

The *Guide to Financial Management Benchmarking* consists of 7 major sections:

1) Introduction – Why is a guide necessary?
2) Overview of Benchmarking: definitions, benefits, practices that promote effective benchmarking in the public sector
3) Roles and Responsibilities
4) Questions to Ask Before You Start
5) The Benchmarking Process: planning, data gathering, analysis and integration, implementation and execution, recalibration
6) Lessons Learned
7) Conclusions

The Guide also contains three appendices: (A) a graphic illustrating the 5 step benchmarking process, (B) *Benchmarking Ethics and Code of Conduct*, (C) A *Case Study* from the Canadian Department of Housing, illustrating he 5 step benchmarking process.

Development of Benchmark Measures for Viability Assessment

John E. Cromwell III and Scott J. Rubin
Prepared for the Pennsylvania Department of Environmental Protection.
Apogee Research, Inc. 1995.

This report was developed into a business plan manual for small water systems in Pennsylvania that can be viewed on-line or download as an MS-Word file at:
http://www.dep.state.pa.us/dep/subject/advcoun/techctr/evalbpmanualfinal3.doc

This report begins with the premise that the business plan "is the framework within which the water system makes an institutional commitment to be self-sustaining and to provide adequate technical, managerial, and financial capabilities to meet future challenges "(p. I-2). The purpose of this study was to develop a methodology to devise indicators and benchmarks to "measure the level of assurance provided in business plans for small water systems" (p.I-5). These indicators are intended to be used not to "determine" viability, but to focus on "assuring" viability (p.I-5). The authors based their approach on the assumption that if water systems are, in fact, businesses, then the methodologies used by investors to evaluate business plans should be applicable to water systems.

The authors cite several objectives for the development of viability assessment tools for small water systems (p. I-1):

1) to better characterize the problem and facilitate the introduction of other resources
2) to identify and target troubled systems so that they can receive assistance
3) to prevent other systems from slipping into trouble
4) to require greater assurances of viability as a condition of the formation of new water systems.

The study began with a search for "indicators"'; those pieces of information that might be related to the ability of a system to meet existing and future performance requirements. Likely candidate indicators were drawn from the physical, demographic, and financial characteristics of water systems serving less than 1,000 connections in the state of Pennsylvania. Data was collected from four state agencies, the US Bureau of Census (1990) and the Pennsylvania Manufactured Housing Association. The main analysis focused on those systems that had the most available data. Both private and publicly managed systems were included. The final data set consisted of 244 systems, in three ownership categories: municipal authorities, municipality-owned systems, and investor-owned (Public Utility Commission-regulated) systems.

The authors also developed an independent field assessment tool in order to rank systems based on 16 criteria that relate to water systems performance. State drinking water officials who were familiar with the systems used this index to perform field assessments of the water systems included in the analysis. A simple statistical analysis tested potential indicator variables against these externally solicited judgments of performance (validation). For those indicator variables that were found to relate to performance, ranges of values of indicators were developed that could serve as potential warning signals of impending problems (calibration). As a final step, the authors compared their benchmarks against rating systems developed by other researchers.

Separate sets of benchmarks were developed for public and private systems because of the "differences in tax laws, financing methods, bond covenants, accounting practices". Based on their research the authors propose 24 benchmarks that can be used to separate successful systems from unsuccessful systems. Managers could be alerted to impending problems if their systems had indicator values that fell into one of two warning categories ranges (represented by yellow and red flags).

The manual also presents "indicator profiles" in the form of a distribution of values in each of the 47 different continuous variables used in the study. These profiles enable water system managers to evaluate the business plan prepared for their water systems to those of similar water systems. The authors caution that no one benchmark or profile can serve to tell the "whole story" of system performance, and, just as in the case of investor evaluation of business enterprises, a healthy dose of subject judgement based upon knowledge of the situation of each water systems is required.

The authors draw several conclusions based on their research:

1) There are key differences between systems by ownership type.
2) The analysis of municipal systems is limited by the differences in accounting practices among municipalities, and the data found in balance sheets is particularly unreliable for this type of analysis. Income sheet data were much more likely to be comparable among systems.
3) The smallest systems analyzed in the study, mobile home parks and homeowner associations, lack the type of financial data that are necessary for this type of analysis.
4) The use of frequency distributions is a particularly good tool for the relative assessment of systems.
5) The "validation approach" used in the study seems to have worked well. The "intuition of field staff seems to be remarkably consistent with financial theory" (p.IV-6, & 7).

The analysis of indicator variables also provided some important conclusions:

1) *SDWA violations*: Monitoring and reporting violations *are* correlated to viability. Maximum contaminant level violations *are not*.
2) *Source water:* Surface water systems are overwhelmingly less able to meet operational demands.
3) *Size*: Groundwater systems serving less than 100 connections (<30,000gpd) and surface water systems serving less than 500 connections (<150,000gpd) are more likely to be in financial difficulty.
4) *Community demographics*: "Troubled systems are in troubled communities".
5) *Water system finances*: Adequate revenue is "absolutely essential to water systems capabilities and performance" and "the institutional structure of the water system is a critical determinant of whether adequate revenues are generated" (p. IV-8)

Table A1. 2 Benchmark Indicators of Viability

Benchmark Indicator	Yellow Zone	Red Zone
For All Systems		
Primary source of water	Surface	Surface
Number of M&R violations in the last 3 years	1 or more	1 or more
Percent of families with incomes below poverty level in municipality	8.0%	9.5%
Median Household income in municipality as % of statewide median household income	95%	90%
Percent of households headed by a person age 65 or over in municipality	27%	28.5%
Percent change in population in municipality during last ten years	1%	-2%
Population of municipality	3,000	1,500
For Municipal Authorities		
Equity Ratio (equity/total assets)	70%	80%
Operating expense per 1,000 gallons	$3.40	$3.80
Net income per connection	$11	$1
Operating revenue per service connection	$310	$350
Operating revenue divided by operating expenses	115%	108%
Revenue per connection as a percent of median household income	1.3%	1.5%
For Municipality-Owned Systems		
Operating expense per service connection	$175	$160
Operating expenses	$65,000	$50,000
Operating revenues	$75,000	$55,000
Operating revenues per service connection	$230	$190
For Investor-Owned Systems		
Operating expense per 1,000 gallons	$2.00	$1.75
Operating revenue per service connection	$285	$220
Operating revenue divided by operating expenses	110%	100%
Revenue per connection as a percent of median household income	0.9%	0.8%
For Groundwater Systems		
Average production (gallons per day)	30,000	25,000
For Surface Water Systems		
Average production (gallons per day)	150,000	125,000
Operating expense per 1,000 gallons	$2.50	$3.00
(page III-39)		

The table above presents some of the indicators developed during this research project. The authors caution that these measures are "conceived as planning tools, intended to support the process of developing water system plans" (p.IV-4) and that the "ultimate measure of viability is the business plan" (p. IV-3).

"Financial indicators measure fiscal health"

Jeffrey L. Jordan, Christopher N. Carlson, and James R. Wilson
Journal of the American Water Works Association. Vol. 89, no.8 (August 1997): 34-40

"The purpose of this article is to provide a set of financial indicators to aid utility managers in their efforts to measure financial health and performance." (p.34)

Based on a review of past studies the author's state that while water systems rarely go bankrupt, "nonviable" systems have two general weaknesses:
1) they are undercapitalized - no reserve or depreciation fund for capital replacement
2) they don't raise enough money to operate an adequate operation and maintenance program.

The problems of water system finance can thus be summed up with two questions:
- Can the system pay its capital needs?
- Can the system cover the full cost of water?

Consequently, utility managers require two types of analytical tools: one to measure the system's ability to raise cash, and another to analyze cash flow for revenue sufficiency.

In order to develop these tools the authors analyzed 1993 state financial audit data on 442 publicly owned utilities in Georgia. They separated these into 4 size categories based on the number of connections (<1000; 1,000 to 10,000; 10 to 50,000; >50,000), Using utility income statements and balance sheets, they collected 22 variables and created 96 non-redundant financial ratios.

Borrowing from the financial literature, the authors use a water analogy to describe financial health of a water system as a function of the size of liquid assets *(the reservoir)*, cash flow *(inflow into reservoir)*, debt (*measure of the potential drain*), and expenditures (*draining of liquid assets*). The likelihood of the business failure of the water system is then described in terms of these factors:
- The larger the reservoir – the smaller the chance of failure
- The larger the inflow (net cash flow), - the smaller the chance of failure.
- The larger the amount of debt – the greater the chance of failure.
- The larger the expenditures relative to revenues – the greater the chance of failure. (p. 36)

The authors divided the 96 financial ratios into four categories that represent the four elements of the reservoir model. Factor analysis was then used to reduce the number of ratios and to select a single best ratio to represent the four components of the model (size of liquid assets, cash flow, debt, expenditures). The four ratios selected by this process were:

Ratio	***Represents***	***Suggested range***
Current ratio: current assets/current liabilities	Size of the reservoir	1.5 - 2.1
Cash flow: Net income + depreciation / principal & interest	Inflow	1.5 +
Debt to equity: total debt/total equity	Potential drain on system	2.1 – 3.1
Operating ratio: Gross revenue / O&M charges:	Expenditures	1.2 and above
Return on assets Net income/net assets	Utility financial performance	6 - 10% (or as high as bond rates)

A fifth variable, Return on Assets (ROA) is also discussed at length in the article. ROA is described as an excellent measure of the how well the total assets of the system of the utility are performing.

The effectiveness of the variables as a financial tool were assessed by using an ordinary least squares regression test with ROA as the dependant variable to see if the four variables could explain the variation in the dependent variable. All four independent variables had a significant effect on ROA.

The authors state that the recommended variables and their values are comparable to those used by Moody's Investor Service. They advise system managers that these ratios will provide the most information by following them across time. The author's also note that these same ratios are used by the American Works Association's *QualServe Program.*

Performance Benchmarking for Water Utilities

Kingdom, Bill, John Knapp, Peter LaChance, and Myron Olstein
AWWA Research Foundation and American Water Works Association, Denver, 1996.

The report does not attempt to present a long list of performance benchmark ratios, since these are "rarely of value because of the need to account for the range of factors that impact those ratios but which are outside the control of management" (p.xix). Rather, this report demonstrates how to go about performance benchmarking by describing all of the necessary steps in the process. The report does present a sample data set of quantitative performance ratios that can be used by practitioners to compare their performance, and "develops a series of models into which utilities can enter their own data to compare their performance to that of an 'average performing utility' faced with the same data values" (p.xx). The report also includes a chapter on sources of water utility data in North America and a case study to demonstrate performance benchmarking techniques. The authors view this study as a "first effort" to introduce benchmarking to water utilities.

The report is divided into two parts with a separate section dedicated to "metric" and "process" benchmarking. Metric benchmarking is defined as "the quantitative measurement of performance in terms of inputs, outputs, outcomes and the relationship between them". Process benchmarking is defined as the "mapping of one's own process and subsequent comparison of your process with those of other companies with exemplary performance in a similar process" (p.11).

The authors used a variety of research techniques in their approach to the investigation of benchmarking. A questionnaire was sent to utilities to determine the extent to which certain performance measures are used. Interviews were also conducted with several of the survey participants. The literature was surveyed to compile a list of available data sources, and the available data was compared with those needed to establish performance benchmarks. A small number of benchmarks were prepared from existing databases, using analytical techniques that ranged from simple ratios to multivariate regression models. A demonstration process benchmark evaluation was also conducted in conjunction with one of the participating utilities.

In the section on metric benchmarking the authors state that there are several requirements for effective performance measurement:

- a set of measures that captures most or all of the key features of the process or function of interest
- an understanding of those explanatory factors that are outside of the control of management that impact performance
- accurate, timely, consistent internal data that are related to the function of interest
- comparable external data from comparable external organizations
- analysis techniques (p.15)

The authors describe benchmarking as an eight step process.

1) Select process or function for benchmarking

Specific areas to be targeted for benchmarking can be derived from the utility's Mission Statement or Strategic Plan. The authors also suggest a list of questions that can be used to guide the selection process (i.e., What is essential to the organization's success?, Where are we currently experiencing problems? What are the critical outputs in the problem areas?, etc.(p.19))

2) Define how to measure performance

The set of measures used to capture performance must be focused on the function to be analyzed and small enough to be easily applied. The authors separate performance measures into two categories, outcome measures and efficiency measures. By their very nature water utilities impact key groups of stakeholders. *Outcome performance measures* are based upon the expectations these stakeholders. The report lists seven groups of stakeholders and presents measures that have been used to capture the needs of these groups. A sample of some of the measures related to these groups appears below:

Area of concern – Item	***Example of measure***
Adequacy measures – availability of raw water	Sprinkler ban not more than once every 10 years
Reliability measures – interruptions to supply	# of customers who experience an interruption in supply without notice
Quality measures - water quality at the customer tap	Volume of water entering system in violation of MCL for total coliform
Customer satisfaction – response to inquiries	Response time to remedy complaints
Staff – accidents or injuries	Industry average over last 3 years
Financial management – quality of management	Bond rating
Stewardship – main breaks	Number of main breaks per mile

Efficiency performance measures have commonly focused on operating and maintenance costs and are usually presented in the form of a single number. Ratios have long served as the standard measurement tool. However, the authors advise against the use of "headline ratios" of inputs to outputs (i.e., $/1,000 gal.) that are often more a result of the operating environment faced by the utility and thus are beyond the control of management. The report includes six appendices containing examples of efficiency measures for various components of water system operation (water resources, treatment, distribution, planning, and support).

3) Define explanatory factors

Explanatory factors are those elements of a water system beyond the control of management. It is important to group water systems by these factors so that comparisons are made between systems that are experiencing similar operational conditions. The report includes a list of 10 such factors

Factor	***Examples***
Physical size	Length of main (mile)
	# of customers (count)
	# of connections (count)
Expenses	Transmission and distribution costs ($ & KWH)
Customer demography	Customer class (# of residential, # of commercial, etc.)
Water consumption	Total (mgd) by class
	Per capita
Asset stock	Unaccounted for water (%)
Human Resources	Contracting out (% of total O&M costs contracted out)
Ownership structure	Type (investor, municipal, authority)
Sources of water	Type (% surface, % ground, % purchased)
Treatment facilities	Capacity (mgd)
Billing	Frequency (times per year)

4) Define data requirements
Data required for the analysis are selected based upon a review of the chosen performance measures, while still accounting for the explanatory factors. If the required data are not readily available from published databases, then the cost of surveying or other data collection efforts must be considered. The quality of the data must be assessed before it is used in any analysis.

5) Select comparison organizations
Organizations chosen for comparison should have explanatory variables that are similar to the subject utility. The number of comparison organizations will depend upon the cost of collecting the required information. The authors recommend a minimum of at least six.

6) Collect data
The authors caution that inaccurate data collection, or the collection of data that are improperly defined will reduce the level of confidence in the final analysis.

7) Analyze data and present findings
Several principal techniques for analysis are described in the report. *Outcome measurement* is a simple comparison of these measures between utilities or utility averages. *Performance ratio* analysis typically consists of “ranking tables” for indicators, which describe the dimension being measured, lists the utilities being compared and show the performance ratio of each. The listing is presented in rank order and utilities can see where their own performance fits into the range of ratios. Again, the authors caution that care must be taken to pay attention to explanatory variables during these comparisons. *Mathematical or statistical modeling* can be used to control for explanatory factors while making performance comparisons. The report contains a separate chapter that provides examples of each type of analysis (see below).

8) Initiate performance improvement program
The goal of performance assessment is to improve the effectiveness of the organization. Review of assessment analysis must be followed by actions that improve performance.

Quantitative Analysis
One chapter of the report is dedicated to providing demonstrations of the analytical techniques that recommended by the authors. All of the examples focus on operation and maintenance costs since it was assumed that there would be broad interest in these measures and "these costs are more likely to be consistent between utilities regardless of size and ownership structure" (p.65). Data from the 1990 AWWA Water Industry Database (WIDB) and the National Association of Water Companies 1993 Financial and Operating Database was used in the analyses. The *outcome measures* approach was demonstrated using a sample of response times to telephone inquiries from a sample of 12 utilities. The data are displayed in tabular form and "while the sample is too small to allow the setting of target performance levels" it clearly demonstrates which utilities have significant room for improvement (p.67).

The use of *performance ratios* is demonstrated through the analysis of eight ratios:
- Total O&M cost ($) per 1,000 gal. sold
- Production O&M cost ($) per 1,000 gal. produced
- Purification O&M cost ($) per 1,000 gal. produced
- Production & purification O&M cost ($) per 1,000 gal. produced
- Transmission & distribution O&M cost ($) per 1,000 gal. sold
- Transmission & distribution O&M cost ($) per mile of main
- Customer accounting cost ($) per account
- Administrative and general cost ($) per account (p.67)

The results from this analysis are displayed graphically, with the ratio values displayed on the y-axis that the "percent of companies less than value" on the x-axis. Each graph also includes a sidebar listing "typical explanatory factors".

A *univariate* regression model of the same 8 ratios is also demonstrated. A log-log form is used to "explicitly account for the economy of scale factors found in a water utility" (p. 73). The results appear in the table below:

Dependent variable (A)	***Independent variable (B)***	***Model***
Total O&M cost	Total annual water sold (mgd)	$A=7631B^{0.815}$
Production O&M cost	Total annual water produced (mgd)	$A=1168B^{0.865}$
Purification O&M cost	Total annual water produced (mgd)	$A=532B^{0.864}$
Production & purification O&M cost	Total annual water produced (mgd)	$A=1036B^{0.911}$
Transmission & distribution O&M cost	Miles of main in service	$A=1395B^{1.093}$
Transmission & distribution O&M cost	Total annual water sold (mgd)	$A=401B^{0.944}$
Customer accounting cost	Total # of customers	$A=42B^{0.949}$
Administrative and general cost	Total # of customers	$A=329B^{0.862}$

Several *multivariate models were* presented to estimate operating costs and staffing level using the information contained in the AWWA WIDB. Several checks were applied to the data and systems with inconsistent or missing data were removed from the analysis. A total of 266 utilities were included in the final analysis. These were grouped by ownership (public/private), services provide (water only/water & wastewater), and supplier (wholesale & retail /retail only). The first model estimated operating costs as a function of the number of user accounts, the percent of ground water used in the system, and the volume of eater delivered to customers. The second model estimated the number of full-time equivalent employees based on the total number of accounts, the volume of water delivered to customers, the percentage of surface water produced or purchased, and the miles of transmission and distribution lines.

System managers can use the predicted values derived from the models to compare against their actual operating expenses and FTEs. In effect, the values derived from the analysis of a large number of systems serve as a benchmark for individual utilities.

The authors also include a chapter that reviews quality and availability of water data, as well as an appendix that lists some of the most readily available sources. The final chapter of the report reviews the current extent of benchmarking in the water industry. They conclude that a small number of measures are in use by virtually all water systems and that this will expand in the future. The final chapter also reviews some of the "challenges" to benchmarking. Six are listed:

- wide differences among US utilities
- difficulty in obtaining comparable financial data
- unreliability of reported operational data
- lack of consensus regarding best practices
- time demands of complex benchmarking
- lack of faith in the claimed benefits of benchmarking (p. 150)

Serving the American Public: Best Practices in Performance Measurement: Benchmarking Study Report

National Performance Review.
June 1997
The report is available on-line at:
http://govinfo.library.unt.edu/npr/library/papers/benchmrk/nprbook.html, or
http://www.npr.gov/npr/library/papers/benchmrk/nprbook.html

The goal of the 1993 Government Performance and Results Act (GPRA) was to improve the management of federal programs through the use of strategic planning and performance measurement. This study, prepared by the National Performance Review (NPR), represents another step in the long history of

administrative attempts to improve the efficiency of governmental activities. For this study, the NPR assembled a team of experts to identify some of the best practices from other governments and the private sector that might assist agencies in implementing "results-oriented performance measurement and performance management." The report outlines many of the basic definitions and procedures needed to understand and apply benchmarking in the public sector.

The report describes performance measurement as "a process of assessing progress towards predetermined goals, including information on the efficiency with which resources are transformed into goods and services (outputs), the quality of those outputs (how well they are delivered to clients and the extent to which clients are satisfied) and outcomes (the results of a program activity compared to its intended purpose), and the effectiveness of government operations in terms of their specific contributions to program objectives."

The study highlights four steps in the benchmarking process:
1) Establish and update performance measures, in order to ensure a narrow, strategic focus and to measure the right thing: "focus on the goal, measure the end results, don't focus on the measurement" (p.13).
2) Establish accountability for performance
3) Gather and analyze performance data. It is important that "data are collected and analyzed to get *answers*" (p.21 – italics in original)
4) Report and use performance information to improve operational efficiency.

Four reasons are cited for measuring performance:
1) set goals and standards
2) detect and correct problems
3) manage, describe, and improve processes
4) document accomplishments

Performance assessment requires the use of indicators or measures that accurately measure the process of interest. A number of criteria must be addressed in creating good measures. A good measure:
- is accepted by and meaningful to the customer
- tells how well goals and objectives are being met
- is simple, understandable, logical, and repeatable
- shows a trend
- is unambiguously defined
- allows for economical data collection
- is timely
- is sensitive

A successful performance measurement system:
- comprises a balanced set of a limited vital few measures
- produces timely and useful reports at a reasonable cost
- displays and makes readily available information that is shared, understood, and used by an organization
- supports the organization's values and the relationship the organization has with customers, suppliers, and stakeholders

Operational definitions for performance measures typically include:
- a specific goal or objective
- data requirements (ie, the pop the metric will include, the frequency of measurement, and the data source)
- the calculation methodology (equations and precise definitions of key terms)
- reports in which the data will appear and the graphic presentation that will be used to present the data

Several useful appendices are contained in the report, including a table listing the benchmarking activities from a survey of firms who participated in the report, a glossary of benchmarking terms, and a list of relevant government publications and contacts.

Benchmarking Water & Sanitation Utilities: A Start-Up Kit (PDF)

William Kingdom
World Bank Water & Sanitation Division, May, 1999
Available at:
http://www.worldbank.org/html/fpd/water/pdf/benchmarking.pdf

This kit is made available to partners interested in compiling cost and performance data for water and wastewater utilities."

The Kit includes the following resources:

- a set of core *indicators on which stakeholders can build their own customized measurement and monitoring system;*
- a data listing complete with robust data definitions;
- a data capture system that also calculates the complete indicator set; and
- a route to share information.

The accompanying data capture software can be downloaded from:
http://www.worldbank.org/html/fpd/water/topics/bench_network.html

Does Your Government Measure up? Basic Tools for Local Officials and Citizens

William D. Coplin and Carol A. Dwyer
Paperback - (November 17, 2000) 156 pages
Available from bookstores (amazon.com list price $20; current price $14)

From the back cover:

"Written for candidates, elected and appointed government officials as well as concerned citizens in small cities, towns, and villages, Does Your Government Measure Up? Is an indispensable tool for improving local government.

In accessible, straightforward language this book introduces the bare essentials for good government in areas of finance, public works, parks and recreation, police, assessment, building codes, emergency medical services, personnel and even Web site development. The authors show how to use benchmarking to increase government efficiency and effectiveness,

The tool presented in the book have been developed by the Maxwell School at Syracuse University in close cooperation with more than 100 government officials in Central New York and throughout the United States.

The book contains:

- Checklists with 60 Bare essential for good governance in nine areas
- More than 255 guidelines found in Beyond Bare Essentials
- Simple illustrations of how you can use benchmarking to make decisions
- User-ready surveys to obtain citizen feedback

An associated web site *(http://www.maxwell.syr.edu/benchmarks/*) enables readers to view additional examples, forms, surveys and to provide a venue to communicate directly with the authors." (see description below)

Public-Sector Benchmarking: A Practical Approach

Kenneth A. Bruder, Jr., and Edward M. Gray
Originally appeared in *Public Management*, September 1994.
Avaiable from the web site of: International City/County Management Association *Performance Measurement Products and Publications* page:
http://icma.org/go.cfm?cid=1&gid=3&sid=101&did=115

This short article reviews the value of benchmarking for public-sector organizations and describes a 7-step benchmarking process, including. a suggested time allocation scheme for each step of the process. The article also includes a case study from the New York City Transit Authority.
This is one of five full-text articles available on the ICMA *Performance Measurement Products and Publications* page (*http://icma.org/go.cfm?cid=1&gid=3&sid=101&did=107).*

An Overview of Performance Measurement

Richard Fischer
Originally appeared in *Public Management*, September 1994.
Available from the web site of: International City/County Management Association *Performance Measurement Products and Publications* page:
http://icma.org/go.cfm?cid=1&gid=3&sid=101&did=111

This article provides a brief summary of the history of performance measurement, provides definitions of key terms, describes the process of developing performance measures and benchmarks, and emphasizes the importance of using benchmarking to initiate continual organizational improvement.

Idaho DEQ Water System Capacity Assessment Tool for SRF Loans: Managerial, Financial and Technical Capacity Indicators for Idaho DWSRF Loans, Preliminary Report (version 2.0)

Jarocki, Bill and Timothy J. Wilkinson.
Environmental Finance Center at Boise State University, March 1997.
Available at: *http://sspa.boisestate.edu/efc/Publications/water_system_capacity.htm*

This document was produced by the Environmental Finance Center at Boise State University in cooperation with the Idaho Division of Environmental Quality. The purpose of the assessment tool is to provide guidance to Idaho and other states as they prepare to meet the 1996 SDWA Amendments.
The report include a variety of measurement criteria for technical capacity, fiscal and financial management capacity and general management capacity. A decision-tree format is used in portions of the report and each component includes a section on "who" should be using the tool and "how to use the results".

The report includes separate assessments for fiscal condition (ability to raise resources for proper operation) and financial management (how fiscal resources are managed). The format of the assessment consists of questions concerning system finances (i.e., frequency of rate review, additional revenues sources, bond rating, etc.) and calculations of various measures

Some of the measures/tests used in the tool include:

- Revenue sufficiency: (*total user charge revenues – total water systems expenses* ≥ 0)
- Affordability:(average residential user charge per month $\leq$ 1.5 percent of average median household income per month
- Cash flow – contingency reserve: (operating cash (annual) $\geq$ 1/8 (O&M + G&A), where:
  O&M=> operating and maintenance expenses, and
  G&A=>general and administrative expenses

Ratio 8

Developed by the Region 10 Environmental Finance Center at
Boise State University for the Alaska Department of Community & Economic Development
Bill Jarocki , Jon Cecil, Sylvia Dana, Michael Pea, and Michael Keith
Environmental Finance Center at Boise State University, October, 2001
Available at: *http://sspa.boisestate.edu/efc/Tools&Services/Ratio_8.htm*

Ratio 8 is a simple financial assessment tool to help you analyze your community water system's financial condition. Using eight ratio formulas, Ratio8 helps you assess the true costs of financing your public water system, as well as look for trends and find ways to make improvements. Ratio8 is an easy-to-use financial assessment tool, designed to compliment any accounting and reporting system. Ratio8 can be used by decision-makers to proactively improve financial capacity. Financial capacity, as part of the TMF strategy, is split into three areas, including revenue sufficiency, creditworthiness, and fiscal management & controls.

Helping you achieve the goal of improving your water system's financial condition, this guidebook and spreadsheet program are designed to help you:

- Better understand your water utility's financial condition
- Analyze information about true costs of financing your public water utility
- Develop integrated information for making long-range decisions about your water utility

The Ratio 8 manual and worksheets (in PDF and Excel spreadsheet format) can be viewed or downloaded from the above web address, or obtained by contacting Bill Jarocki by e-mail bjarock@boisestate.edu or telephone, 208.426.4293.

Benchmarking Web Sites

American Productivity and Quality Center (APCQ)

http://www.apqc.org/

For more than two decades the American Productivity & Quality Center has remained steadfast in its mission of working with people and organizations around the world to improve productivity and quality. A nonprofit organization supported by nearly 500 companies, government organizations, and educational institutions, we:

- discover, research, and understand emerging and effective methods of both individual and organizational improvement;
- broadly disseminate our findings through education, advisory, and information services; and
- connect individuals with one another and with the knowledge, resources, and tools they need to successfully manage improvement and change.

APQC has become a world-renowned resource for process and performance improvement for organizations of all sizes across all industries. We provide the tools, information, expertise, and support needed to discover and implement best practices in a variety of areas including:

- benchmarking and best practices,
- knowledge management,
- customer-focused systems,
- organizational effectiveness,
- performance measurement,
- shared services, and
- k-16 education.

In all these efforts, APQC functions in a neutral, nonpartisan way through its nonprofit status and global partnerships and affiliations.

QualServe Benchmarking Clearinghouse

http://www.awwa.org/Science/qualserve/benchmarking.cfm

"The Benchmarking Clearinghouse provides the tools needed to improve the quality and performance of water and wastewater utilities

Benchmarking is the third pillar of QualServe, offering metrics as assessment tools and best practice studies geared to help utilities improve performance. A full suite of support services is in development. All QualServe Benchmarking Clearinghouse services are designed to meet the specific needs of utilities while keeping them involved in the broader practice of benchmarking throughout the world.
The Benchmarking Clearinghouse provides training, information exchange, reference materials, best practice studies, networking opportunities, and the development of a metric database of high-level performance indicators. Many of these services are available now, directly and through our affiliation with the world renowned American Productivity and Quality Center (APQC). Others are under development by AWWA and AWWARF. The Clearinghouse will be fully operational in 2003. The Clearinghouse is fully supported by basic membership fees and fees for participation in training and studies. Water and wastewater utilities are eligible for membership at present. Memberships for consultants and others will be considered later. All Clearinghouse members receive complementary membership in APQC."

The Community Benchmarks Program

The Maxwell School at Syracuse University
http://www.maxwell.syr.edu/benchmarks/index.htm

In June of 1996, the Maxwell School of Citizenship and Public Affairs at Syracuse University formally established the Community Benchmarks Program (CBP) as part of the new Alan K. Campbell Public

Affairs Institute. The faculty, staff and students of the Public Administration and Public Affairs programs jointly support the program. During the first two years of the program, activity has occurred in three areas:

1. Local government performance
2. Non-profit performance
3. Training/Consultation in Benchmarking

The Community Benchmarks Program conducts and disseminates research that describes community conditions, encourages citizen participation, fosters civic discourse and provides a basis for public, private, and non-profit sectors to improve the quality of life within Onondaga County.

The web site enables readers to view additional examples, forms, surveys and to provide a venue to communicate directly with the authors. The following benchmarking studies can be downloaded from the web site:

- Comparison of Law Enforcement Contracts in Onondaga County, *2001*.
- Comparison of Municipal Department Heads in Onondaga County, *Fall 2000*.
- Comparison of Salaries and Benefits of Elected Municipal Officials in Onondaga County, *April 2000*.
- Municipal Web Sites in Onondaga County: A Study Comparing Selected Characteristics, *December 1999*.
- Trash Studies: an Analysis of Trash Services in 35 Municipalities, *June 1999*.
- Comparison of Cost and Selected Characteristics of Police Services in Onondaga County, *May 1999*.
- Jamesville-Dewitt High School Benchmarking Project: Year One Report, *September 1998*.
- Benchmarking Local Government Services in Onondaga County: A Demonstration Study of the 19 Towns and City of Syracuse, *September 1998*.
- School Finance Trends in Syracuse: 1997-1998, *June 1998*
- Selected Government Performance Outcomes for the City of Syracuse: Comparisons of the Six Residential TNT Sectors in the Areas of Crime, Fire, Streets, Trash and Parks, *June 1998*

Department of Energy Environmental Management Benchmarking Clearinghouse

http://www.em.doe.gov/bch/index.html

The Clearinghouse is designed to share benchmarking lessons learned, stimulate the development of new study approaches, and promote benchmarking as a means for continuous improvement.

The web site include links to a large number of publication, annotations, and web site that will be of use to those interested in developing benchmarking procedures.

Appendix A2.

Sources of Benchmarking Data

The following publications and web sites are a sample of a few of the available sources of reference materials that can be used in the selection of benchmark indicators and the range of values of these indicators. They all relate to drinking water systems. Most are available for free or at minimal cost. These resources can serve as a reference to the selection of indicators measures that are already in use, and offer the range of values of these indicators for different types and sizes of drinking water enterprises.

The summary information describing each resource is taken directly from the source materials or web sites and appear in quotation marks.

1995 Community Water System (CWS) Survey

USEPA
EPA 815-R-97-001a
January 1997
273 pages

2000 Community Water System (CWS) Survey

USEPA
EPA 815-R-02-005A
December 2002
273 pages

"The U.S. Environmental Protection Agency (EPA) conducted the 2000 Community Water System (CWS) Survey to obtain data to support its development and evaluation of drinking water regulations. Most of the operating characteristics of community water systems are unchanged from 1976, when the first CWS Survey was conducted. The vast majority of systems are small and privately owned, but most people are customers of large publicly owned systems. Nevertheless, there have been some important changes since the first CWS Survey. This publication reports on trends and key findings from the survey."

Volume I of the report summarizes the results of the survey, and includes a discussion of several of the most common financial indicators. Volume II of the report contains more than 100 tables displaying financial and operating characteristics of the surveyed water systems, disaggregated by ownership type, water source and size categories.

Both the 1995 and 2000 surveys can be downloaded from the USEPA Ground Water and Drinking Water website at:

http://www.epa.gov/safewater/cwssvr.html

Hardcopies of the both reports can be obtained from either:

USEPA Office of Water Resource Center (OWRC)
(202) 260-7786
http://www.epa.gov/safewater/resource/

National Service Center for Environmental Publications (NSCEP): ncepimal@one.net
(800) 490-9198;
http://www.epa.gov/ncepihom/ordering.htm

National Characteristics of Drinking Water Systems Serving Populations Under 10,000

USEPA
EPA 816/R-99-010
July 1999
87 pages
Available online at:
http://www.epa.gov/safewater/smallsys/ndwac/smallsys.pdf

"This report addresses questions raised by the National Drinking Water Advisory Council's Small Systems Working Group concerning the characteristics of small drinking water systems in the United States. The report is a national characterization based on existing data and therefore may not discuss issues particular to any one State or environment. The data in the report were drawn primarily from three sources: the 1995 Community Water System Survey, the 1995 Drinking Water Infrastructure Needs Survey, and FY98 data from the Safe Drinking Water Information System (SDWIS).

The report is divided into 8 sections:

1. Introduction
2. Ownership Characteristics
3. Operating Characteristics
4. Financial Characteristics
5. Infrastructure Needs
6. Compliance and Violations
7. Noncommunity Water Systems"

Or in hardcopy from the OWRC or NSCEP (see above)

Water & Wastewater Utilities, Indicators 2nd Edition (PDF)

Guillermo Yepes, Augusta Dianderas
World Bank
Water Supply & Sanitation Division
May, 1996
57 pages

Available online at:
http://www.worldbank.org/html/fpd/water/pdf/indicators.pdf

This PDF publication contains information on the use of comparative indicator measures as well as a sample of the values of these indicators from many countries. The preface from the publication appears below:

"Indicators can be a valuable tool to sector staff and practitioners working in the evaluation of operations and investments of water and sanitation utilities. To make this job more manageable indicators on *Water and Waste-Water* services, mainly in urban areas, have been grouped into three sets:

1. Operational Indicators (first edition, April 1993)
2. Financial Indicators (first edition, June 1994), and
3. Overview of Tariff Rates and Structures (first edition, June 1994).

In response to the heavy demand, this second edition has been updated and expanded with additional information collected since the three sets were first published.

Indicators have been collected from a selected group of utilities from industrialized and developing countries. Indicators from the former group are believed to represent 'acceptable' or 'desirable' outcomes or best practice. General information about the utilities cited is presented in Tables 1 and 2.

Staff working in operations have day today contact with utilities and therefore are in the best position to collect the information required to keep this information up to date. It is only through your collaboration and that of practitioners that we will be able to keep these indicators current and to expand them. We appreciate the inputs and feedback received from staff in operations after the first edition was published and look forward to continue receiving your comments, suggestion and additional data."

Benchmarking Water & Sanitation Utilities: Network of Core Indicator Values

"The Benchmarking Water & Sanitation Utilities Project is an initiative aimed at facilitating the sharing of cost and performance information between utilities and between countries by creating a network of linked web sites, through global partnership efforts. Each web site presents values for a set of core cost and performance indicators for a utility, or utilities, in that particular region or country. The value of the network increases with each new partner. If you would like to participate with us please contact the Water Helpdesk at the World Bank."

This page can be accessed online at:

http://www.worldbank.org/html/fpd/water/topics/bench_network.html

Indicator values for the US can be downloaded in Excel format from the US Node at:

http://www.worldbank.org/html/fpd/water/topics/bench/usnode.html

Core Indicator Values for individual utility partners participating in the program can be accessed at:

http://www.worldbank.org/html/fpd/water/topics/bench/bench_network_iup.html

In order to allow performance comparisons to be made between utilities a set of key explanatory factors are provided for each utility. These explanatory factors are:

- Utility size band (in terms of population served)
- Range of services provided (water, sanitation, both, other)
- Extent of private sector involvement

Development of Benchmark Measures for Viability Assessment

John E. Cromwell III and Scott J. Rubin
Prepared for the Pennsylvania Department of Environmental Protection
Apogee Research, Inc. 1995
http://www.dep.state.pa.us/dep/subject/advcoun/techctr/evalbpmanualfinal3.doc

This report (annotated in the previous section) also includes several tables that display the percentile range of values for indicators used in Pennsylvania for three different
(pages 18-20)

The report is available online (in Microsoft Word format) at the web address above.

Comprehensive Guide to Water and Wastewater Finance and Pricing

George A. Raftelis
Lewis Publishers, 1993
Available from booksellers (*Amazon.com* price $95)

This guide (review in the following section) includes several appendices that contain survey data that may be used in comparing water systems. These surveys (1992 Ernst's and Young's 1992 National Water and

Wastewater Rate Survey) include details on water rates for 158 utilities in the 100 largest MSAs in the US are also included in several appendices. Although these are not small systems this still can serve as a useful guide to small systems to see what rates and rate making practices are in use by some of the nation's leading utilities. Chapter 12, *Comparing Water and Wastewater Rates Among Utilities*, provides a "how-to" guide for making water system comparisons. The book also contains numerous examples and case studies.

The author notes that in order to compares rate among communities, factors that affect the costs to be recovered through water and wastewater pricing and the pricing structure need to be considered. These include:

- geographic location (topography, urban/rural, climate, customer density)
- peak demand and growth potential (i.e., resorts)
- customer constituency – few high volume users or many small users
- level of treatment – quality of influent water
- level of general fund subsidization –
- level of grant funding (impacts capital requirements and therefore rates)
- infiltration and inflow levels (adds to cost)
- rate-setting methodology (especially, the level of revenue recovered from rates and distribution of costs to classes)
- others: technical or organizational efficiency; labor costs; employee training/expertise (p.238-242)

Benchmarking Performance Indicators for Water and Wastewater Utilities

Edited by Angela K. Lafferty and William C. Lauer
AWWA Bookstore, 2005
Price: $ 695.00; AWWA Members $495.00
Softbound, 297 pp

"How does your utility's performance stack up to others around the country? Now you will know. Now, for the first time, you can compare your water or wastewater utility in key benchmarking areas that cover the entire range of utility activities. 22 benchmark indicators are provided for water operations, wastewater operations, organizational development, business management, and customer relations. You can compare "apples to apples" by utility size, customers served, millions of gallons per day treated, geographic location, and many other parameters of your choosing.

Benchmarking identifies your utility's strengths and weaknesses as compared to similar utilities across the country -- and that is the first step to making your utility the best it can be. More than 200 utilities participated in the benchmarking survey. Catalog Number 20564. "

This report describes the 22 key performance indicators identified by the 2004 AWWA Research Foundation study Selection and *Definition of Performance Indicators for Water and Wastewater Utilities,* and provides comparative values from different types and sizes of utilities. The measures included in the report are listed by category below.

Organizational Development

- Organizational Best Practices Index
- Employee Health and Safety Severity Rate
- Training Hours Per Employee
- Customer Accounts Per Employee, MGD Water Delivered Per Employee, MGD Wastewater Processed Per Employee

Customer Relations

- Customer Service Complaints and Technical Quality Complaints
- Disruptions of Water Service
- Residential Cost of Water and/or Sewer Service
- Customer Service Cost Per Account
- Billing Accuracy

Business Operations

- Debt Ratio
- System Renewal/Replacement Rate
- Return on Assets

Water Operations

- Drinking Water Compliance Rate
- Distribution System Water Loss
- Water Distribution System Integrity
- Operations and Maintenance Cost Ratios
- Planned Maintenance Ratio

Wastewater Operations

- Sewer Overflow Rate
- Collection System Integrity
- Wastewater Treatment Effectiveness Rate
- Operations and Maintenance Cost Ratios
- Planned Maintenance Ratio

Appendix A3.

Financial Training Tools and Resources

This appendix contains a list of training resources targeted specifically at water system financial management. Those descriptions of these training materials in quotations are taken directly from original sources, or from the National Drinking Water Clearinghouse Drinking Water Products Catalog, or from the Final Project Report of the Benchmarking Investigation.

Workshop does not cover accounting/financial management per se – so here are some handbooks and other resources to use to guide management skills improvement.

Managing Your Utility's Money: A University of Tennessee Municipal Technical Advisory Service Workshop

Sponsored through a grant from USEPA
1991

Trainer's Manual and *Participant Workbook* available from National Environmental Training Center (800-624-8301) $23.25

"The purpose of this workshop is to present financial management and user fee information for local officials. These seminars provide local officials with information that they can use to in improving the financial health of water and wastewater treatment operations. The workshop will help participants establish sound financial management practices, assess the financial health of water and wastewater systems and raise revenues through increasing user fees." (NDWC Drinking Water Products Catalog description)

The Water Board Bible: The handbook of modern water utility management

(revised edition, 1995)
Ellen G. Miller and Elmer Ronnebaum, Kansas Rural Water Association Board
Available from National Environmental Training Center (800-624-8301)

"The purpose of this handbook remains the same: To aid board/council members and utility employees who are the stewards of your community. …. This handbook was written for board members, mayors, city council members and utility employees. We hope that you use it as a measuring stick to see how your system is doing today – and where you could improve." (NDWC Drinking Water Products Catalog description)

Section 6 Budgets and Audits:
Section 6 Qwikview: "Budgets and audits are more than a duty. They can help your council and board see the all-important big picture. This section reviews several types of budgets and audits – and hot they can help your board do a better job. Check out the five steps for increasing your return from budget-making and take the 'Budget and Audit" Pop Quiz."

Section 11. The Next Generation
Section 11 Qwikview: "Assuring that your water or wastewater system meets your future needs requires action now. This section discusses several issures such as board/council recruitment, changing attitudes among customers and employees, financial realities and the hot topic of viability. Take the 'Sure we're ready' pop quiz."

Financial Accounting Guide for Small Water Utilities for Small Water Utilities

Michael D. Peroo, made available through the Kansas Rural Water Association
March, 1997 (67 pp.)
Available from *National Environmental Training Center*
(800-624-8301); (product code DWBKFN14)

"This document provides a comprehensive look into small system accounting. It explains how to set up a simple accounting system that provides system managers the information required to make financial decisions. The guide offers basic concepts needed to understand small water utility accounting, an explanation of how to create a steady flow of information, and tips to developing an accounting system." (NDWC Drinking Water Products Catalog description)

A Water and Wastewater Manager's Guide for Staying Financially Healthy

USEPA. Office of Water
EPA Publication 430-09-89-004
1989 (8 pp.)
Available from National Environmental Training Center (800-624-8301)
(product code FDBLFN03)

"Designed to help water and wastewater utility managers understand some of the the important principles of financial management, this booklet provides management tools to keep utilities financially healthy and running smoothly. It includes information about how to determine the current financial status of a utility and how to lay a financial foundation to secure its future." (NDWC Drinking Water Products Catalog description)

Utility Manager's Guide to Water and Wastewater Budgeting

USEPA. Office of Water.
EPA Publication 430-09-89-004.
1994 (21 pp.)
Available from National Environmental Training Center (800-624-8301)
(product code FDBLFN13)

"This user-friendly booklet presents financial concepts that are helpful to water or wastewater managers when developing their annual budgets. Offered are sources of possible revenue, expenses to consider, suggestions on gaining public support, and examples to assist with developing revenue and trends information." (NDWC Drinking Water Products Catalog description)

PAWATER Users Manual: Financial Planning Model for New Small Community Water Systems (Program Version 2.2)

Gannet Fleming Inc., Wade Miller Assoc. Inc.
1992 (177 pp., and Windows software)
Available from National Environmental Training Center (800-624-8301)
(product code DWSWFN01)

This software enables water officials to enter data about new small community water systems, including potential water consumption and water treatment requirements, and obtain a cost estimate of the detailed program."

Managing a Small Drinking Water System: A Short Course for Local Officials

The National Environmental Training Center for Small Communities
The Walkabout Co.
Training Consultants, Inc.
2000 (Version 0201)

"This new curriculum was developed to help local officials implement management practices that will improve their ability to provide safe drinking water to their communities in accordance with the reauthorized Safe Drinking Water Act. The training materials are designed to be flexible, applicable across the country, and easy for both trainers and local officials to use.

The modular training package addresses the major items that local officials and decision makers need to know to develop or enhance the technical, managerial, and financial capacity of their systems. The course is designed to help local officials run their systems like a business, to keep it in compliance, and deliver clean, safe drinking water.

The training Package includes a Trainer's Guide with instructors notes, overhead transparency masters, audio/visual aids, recommended instructional strategies and learning activities; a PowerPoint® presentation available in PC or MAC formats; a Participants Manual that includes 10 modules (eight printed and two videos), job aids, and recommended resources that can be used for self-study or in the classroom. The training modules include:

Module 1: Local Official's Responsibilities for Providing Safe Drinking Water
Module 2: Regulatory History, Current and Future Requirements
Module 3: Basics of Drinking Water Systems (video)
Module 4: Drinking Water System Operations and Maintenance (video)
Module 5: Administrative Management Practices
Module 6: Working with Consultants and Technical Assistance Providers
Module 7: Managing People
Module 8: Communicating with the Public
Module 9: Financial Management
Module 10: Financial Options for System Projects or Upgrades

The entire package or specific components may be purchased to suit local training needs. Multiple Participant Manuals may also be ordered for training sessions, NETCSC offers quality training materials at a rate designed only to recover the cost of production."

The complete training package is available from the *National Environmental Training Center for Small Communities* for $127.50. Separate components can also be purchased.
Phone: (800) 624-8301, or (304) 293-4191
Email: netc_orders@mail.estd.wvu.edu

The Show-me Ratemaker Workshop

Missouri Department of Natural Resources
Division of Environmental Quality
Technical Assistance Program

The *Ratemaker Workshops* are offered periodically throughout the at different locations across the state of Missouri, and have also been presented at several sites outside the state. The *Workshops* provide training in the use of the *Water User Charge Analysis Worksheets* (described in detail below). The *Workshops* are open to any person who sets rates or makes decisions that affect the finances of water or sewer systems. Attendees do not need to be residents of the State of Missouri. The cost of the workshop is $40 and includes lunch and break refreshments. Pre-registration is required.

For more information contact:

Missouri Department of Natural Resources
Environmental Assistance Office
Show-me Ratemaker Workshop
P.O. Box 176
Jefferson City, Missouri 65102
Phone: (573) 526-6627 or 1-800-361-4827
Fax: (573) 526-5808
Home Page: www.dnr.state.mo.us/deq/tap/lgov.htm
Email: tap@mail.dnr.state.mo.us

Drinking Water User Charge Analysis Worksheets

Missouri Department of Natural Resources
Division of Environmental Quality
Technical Assistance Program

The *Drinking Water User Charge Analysis Worksheets* are included in the *Environmental Management Institute Suite*. This collection of Microsoft Word, Excel and PowerPoint files can be downloaded at:

http://www.dnr.state.mo.us/oac/emiapps.htm

The EMI Suite includes model ordinances for sewer, water, land disturbance, stormwater and other issues. It includes spreadsheets to help you analyze your water and sewer user charge systems, project costs and revenues and develop new rates. It also includes worksheets to help you assess the technical, managerial and financial capacity of your water and wastewater systems

The *Drinking Water User Charge Analysis Worksheets* prompts users to enter their data into highlighted fields. Users can adjust some of the assumptions (such as inflation and interest rates) contained in the fixed cells of the spreadsheet to match their particular situation.

These spreadsheets can provide managers with several important types of information and outputs:

- Determine if current rates are high enough to produce adequate revenues to cover current costs and obligations
- Determine if rates are fair and equitable between user classes
- Print out pre-packaged overheads to use in decision making meetings and rate increase hearings
- Can produce projections of systems financial conditions for each of the next five years.

These spreadsheets require users to input detailed information about their system, including:

- Customer billing records for the analysis subject year
- Schedules of user charge rates
- Hook up and other relevant fees
- Financial records of the analysis subject year that include revenues and cost information
- Flow volume
- Equipment repair and replacement schedule
- Annual median household income of customers.

Several worksheets are included that can be printed out and used by managers to collect the data used in the analysis:

- Water customer usage – used to develop average monthly usage by class
- Water customer usage profile – for example: "typically 30 % of customers will use less than 4,000 gpm and use less than 10% of all water supplied"
- Revenue vs. customer usage – compares revenues with usage and revenues collected
- Water equipment repair and replacement schedule – helps examine system costs – helps decide how much money to set aside to make major replacements and future repairs
- Projected fixed costs/minimum water bill & projected variable costs/water unit charges.

Users can print out several charts that report indicator measures across a five year period:

- Coverage and operating ratio
- Unit charge and minimum charge
- Average rate increase and affordability index
- Working capital goals and net revenues
- Total operating revenues, total operating costs, net operating revenues.

Small System Guides

The Rural Community Assistance Program's Community Resource Group, publishes a number of *Small System Guides* to assist the local decision-makers of small and rural communities. The following publications all pertain directly to financial management. Guides for other management concerns are also available. The complete list of Guides can be found on the Internet at:

http://www.crg.org/smallsystems.htm

Guides can be obtained by calling (479) 756-5583 Extension 237. Minimal charges (about $5.00 each) apply.

Community Resource Group, Inc.
P.O. Box 1543
Fayetteville, AR 72702
Phone: (501) 443-2700
Fax: (501) 443-5036
http://www.crg.org/

The Small System Guide to Financial Management

Contains an overview of financial management; small system planning; the annual budget process; developing your expense budget; estimating system revenue and balancing the budget; monitoring the budget; developing and implementing a collections policy; and establishing internal controls. 34 pages.

The Small System Guide to Rate Setting

Keeping track of your system's financial health through operating and coverage ratios; basic rate structure principles, short- and long-term aids for balancing the budget; typical rate structures; analyzing customer usage; revenues versus customer usage; cost recovery in the user charge system (includes a detailed description of fixed and variable costs); setting the minimum rate and break-even flow charge; setting rate breaks and rate blocks; and gaining customer support for a rate increase.

Five events are considered as sufficient signals to trigger a rate review:

1) Revenue did not exceed expenses in each of 3 years
2) Unable to make scheduled debt payments
3) Out of compliance with drinking water standards
4) Unable to cover emergency and preventive maintenance expenses
5) No rate increase in the last three years

48 pages.

The Small System Guide to Planning, Financing, and Constructing Facility Improvements
Contains information about the facility development process; how to hire an engineer; the preliminary engineering report; determining how much you can borrow; sources of financing (RDA loans, grants, emergency grants, guaranteed loans; CDBG; Community Loan Fund; general obligation and revenue bonds; public-private partnerships); final design; regulatory approval; bids; and construction. 58 pages.

The Small System Guide to Viability
This Guide is in the form of check lists. Includes a discussion about small system viability; assessing the potential impact of new regulatory requirements on your system; assessing your water supply; assessing system components; assessing your managerial capability; and assessing your financial capability. 48 pages.

The Small System Guide to Rural Utilities Service Management Reports
This publication describes the RUS Annual Budget; RUS Monthly or Quarterly Reports; RUS Year-End Reports; a checklist of information needed to complete the RUS Year-End Reports; and samples of completed forms of each report required for those who have RUS loans. 44 pages.

The Board Guide to Small System Policies
An overview of system policies; establishing rules, policies and regulations for water provision; governance policies; financial management policies; personnel policies. 42 pages.

The Small System Guide to Factors that Affect Capital Financing
This publication looks at the "hidden" factors that affect the bottom line of what your customers have to pay for financing capital improvement projects, including, Considering Financing Options, Types of Payment Methods, term, rate, financing costs, imposed costs, delay, ineligible costs, and coverage ratios. 28 pages.

The Small System Guide to Capital Improvements Planning
This book contains a basic description of the capital improvements planning process using a hypothetical small water utility to guide the reader through each of the steps in the process. The book also contains blank forms and tables for the Board to complete for their own system. 36 pages.

Self -Evaluation Guide for Decision-Makers of Small Community Water Systems
This workbook is designed to lead Board members through all the important phases of small system management and operation so they may assess their own strengths and weaknesses. 86 pages. Answer sheets available.

Accounting for Rural Water Systems: A Practical Approach.

Steve Fite
Prepared for the National Rural Water Association, under contract from the USDA Farmers Home Administration.
Washington, 1980

While this book is intended for the managers of rural water systems the author hopes that it will be useful to rural water boards, accountants, funding officials, and all rural water decision makers. It provides a complete guide to the establishment and maintenance of accounts that will meet Generally Accepted Accounting Principles, thus allowing small systems to easily conform to lending and management requirements. It also contains detailed description of accounts, and details on starting up a bookkeeping system.

The book provide details on how various cost and revenue elements can be allocated so that they can later be used to develop financial ratios to evaluate system performance. It also provides recommendations on how to handle inventories and depreciation, and serves as a reference source of financial definitions. The book contains a brief section on financial analysis using the information developed from the accounting

system. The author recommends that the following accounting information should be routinely collected and reviewed.

Income Statement

- (Net Gain – Income) > Expenses
  - Shouldn't be too large - recommended that Gain <20% of total sales
  - Break even is ideal (when assets are properly depreciated)
  - Loss of more 10% of total sale dictates action (raise rates/reduce expenses) - Small systems have few areas to reduce expenses
- Average Income and Expense per meter
- Cost of producing water

Balance Sheet

Managers should observe trends in cash funds, reserve, total cost of system, remaining debt, membership fees, and retained earnings.

Water Loss

Managers should check this with their Master meters. Loss should not exceed 10 percent.

Water Utility Accounting (Second Edition)

Jacque D. Grinnell and Richard F. Kochanek
Prepared for the American Water Works Association.
1980

The purpose of this publication is to meet two basic needs: "1) to provide water utility managers with an understanding of how accounting information can aid them in performing the management function more efficiently and effectively" and (2) to help give trained accountants "insight into the information needed by the various groups interested in the activities of water utilities." (p.iii)

The book assumes that the reader has some knowledge of accounting and addresses the needs of both investor-owned and municipal water systems. Examples of all accounting concepts are presented using examples from actual water system accounts.

Some basic assessment techniques (historical comparisons, comparing actual and budgeted revenues/expenses, unit cost standards) are described but the major emphasis of this publication is as a reference source for the operation of water utility accounts. (Note: A 3rd Edition of *Water Utility Accounting* was published in 1995 but was unavailable for review.)

The 1995 edition of *Water Utility Accounting* is available from AWWA bookstore:
ISBN 0-89867-761-0.
Hardback, 1995, 327 pp. Catalog no. 10007A,
Non-member Price: $105.00,
Member Price: $69.00
Order online at:
http://www.awwa.org/bookstore/timssnet/common/tnt_frontpage.cfm

or, Call 1-800-926-7337

Comprehensive Guide to Water and Wastewater Finance and Pricing

George A. Raftelis
Lewis Publishers, 1993
Available from $95

This book can serve as a primer on financial planning, alternative financial mechanisms, and the process of determining water and wastewater prices. The book also contains numerous examples and case studies. The editorial review from Amazon.com appears below.

"*Comprehensive Guide to Water and Wastewater Finance and Pricing, Second Edition* provides an updated and expanded examination of the principal aspects of financing and pricing for water and wastewater utilities. Organized in two sections, this new edition covers everything from privatization and setting rate structures to long-term and short-term financing. Traditional and innovative financing methods and pricing structures are provided. The guide also shows how to design appropriate pricing structures to ensure equity and self-sufficiency.

What's new in the Second Edition? Comprehensive Guide to Water and Wastewater Finance and Pricing, Second Edition has been significantly revised and expanded to address current trends in the industry. The new edition features expanded discussions of state revolving loan funds (SRFs) as a financing method for local governments, the privatization concept and current incentives and disincentives associated with environmental privatization, the impact on public private partnerships of the President's executive order relating to grant funded facilities, and proposed tax legislation that could have a significant impact on environmental infrastructure financing. The new edition provides a detailed example of how a utility would establish revenue requirements and then structure a set of rates to recover these requirements. It also provides a comprehensive chapter on conservation pricing which discusses the background of conservation rates, advantages and disadvantages, and design considerations of conservation rate structures (uniform rates, inverted block rates, seasonal rates, and marginal cost rates). Results from Ernst & Young's 1992 National Water and Wastewater Survey are supplied as well. Comprehensive Guide to Water and Wastewater Finance and Pricing, Second Edition will be an indispensable reference for water and wastewater management, professional engineers, U.S. government officials, state and local government planners, investment bankers, utility entrepreneurs, directors of water and wastewater utilities, finance managers, utility and environmental attorneys, and financial and rate consultants."

Environmental Finance Tools and Services -

Region 10 Environmental Finance Center (EFC) at Boise State University
Available at: *http://sspa.boisestate.edu/efc/services.htm*

The Environmental Finance Center at Boise State University has a variety of tools and services available on its web site.

In addition to the *Ratio 8* financial assessment tool described above, the EFC offers:

- *The Directory of Watershed Resources* - An on-line, searchable database of financial resources for watershed restoration in Oregon, Idaho, Washington and Alaska
- *CAPFinance*™ - An integrated capital asset inventory and reinvestment analysis software program for drinking water systems.
- *RateMod Pro*™ - Powerful, easy-to-use rate-setting, development fee and financial planning software for water and wastewater utilities
- *EFC's Guidebook of Financial Tools* – which describes over 200 financial tools, explains the actual and potential uses of financial methods and their advantages and disadvantages, and describes case studies which demonstrate the use of financial tools *(Download Guidebook of Financial Tools from the EPA's homepage. http://www.epa.gov/efinpage/guidebk/guindex.htm)*

The Region 10 EFC web site also provides access to a number of other financial services and workshop opportunities.

USEPA - Drinking Water Academy (DWA) Electronic Workshop

USEPA Office of Ground Water and Drinking Water (OGWDW)
http://www.epa.gov/safewater/index.html

"The Drinking Water Academy's Electronic Workshop contains three types of information:

- Training modules
- Short presentations
- Links to other information sources

The self-paced training modules give a broad introduction to the many facets of the Safe Drinking Water Act (SDWA). Although live training courses are the best training experience, DWA's limited budget can only support a small number of classes each year. Through the Internet, the DWA can reach many more people with SDWA information based on our training courses."

The complete list of Electronic Workshops, Training Modules, Presentations, and Other Information can be viewed or downloaded from:

http://www.epa.gov/safewater/dwa/electronic/ematerials.html#SWP

One of the Public Water System Operations training modules specifically addresses the financial assessment of drinking water systems. The *Developing Financial Capacity* module can be downloaded at:

http://www.epa.gov/safewater/dwa/electronic/presentations/pwsoper/fincapacity.ppt