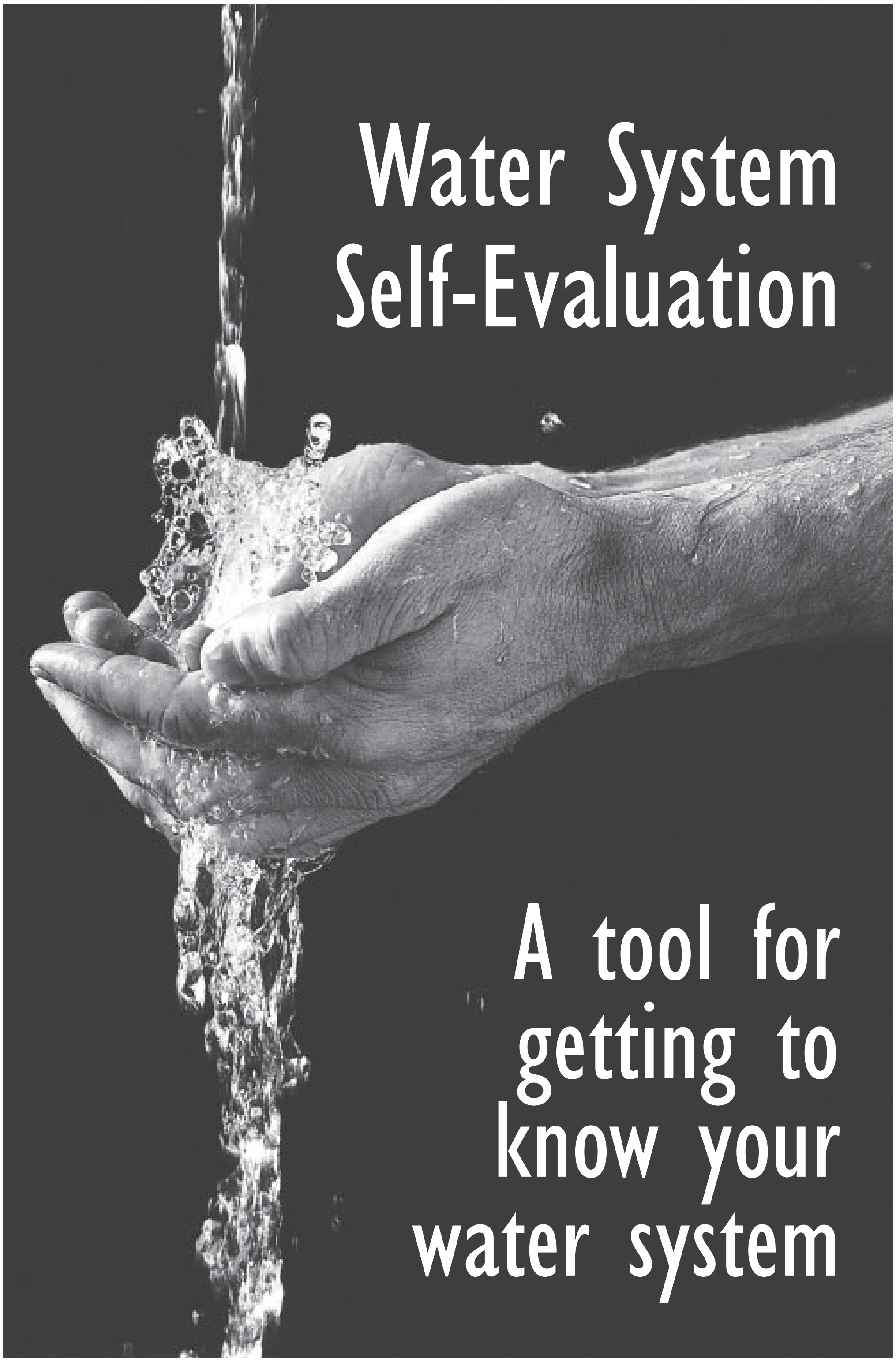
Colorado Department of Public Health and Environment

Water Quality Control Division



Developed by the Maryland Center for Environmental Training at the College of Southern Maryland

Introduction

The Public Water System Self-Evaluation instrument was developed to help the managers and operators of local water supply utilities to accomplish three important objectives.

- Obtain an accurate measurement of the technical, managerial and financial strength of your drinking water system;
- Develop capital and operation and maintenance planning strategies, and parallel budget-making expertise;
- Incorporate into your daily routine a proactive approach to complying with both existing and future regulatory requirements imposed by the Safe Drinking Water Act and various state laws and regulations.

Completing the Evaluation

Public water systems completing this self-evaluation almost certainly will require the participation of more than one individual. The system's Chief Operator(s) or Superintendent will normally have to complete the technical sections, while the financial and managerial portions of the questionnaire will need to be delegated to public works directors, town or county managers, clerks or other local officials, and perhaps auditors.

The instrument is organized into major sections, and discrete subsections, so that the strengths and weaknesses of a system are revealed individually. This should allow you to more easily prioritize both immediate and future needs. It is recommended that the self-evaluation be done annually, **as a prelude to budget preparation.** When prepared just prior to budget discussions, the evaluation can provide critical information about the short- and long-term needs of the system and their estimated costs.

The simple charts contained in this document are meant to pinpoint and catalogue any key weaknesses in the present source water and treatment systems. The categories included in the charts hardly exhaust the possibilities: you are encouraged to elaborate on any other existing situations that impede the efficient operation of the treatment facilities.

Table of Contents

I. General System Identification

The information to be collected in Section I is basic facility data, much of which may be obtained from operating records, system plans and specifications, maintenance logs, reports to regulatory agencies, and other documents in the system's files.

A. System Description

Names and Titles of People Completing this Evaluation

____

____

____

Date(s) Completed ____

System Name and ID Number ____

System Owner ____

System Operator (if contracted) ____

Current Population Served ____

Projected 5-Year Population of Service Area ______________________________

Projected 10- Year Population of Service Area ____________________________

Number of Residential Connections _____________________________________

Number of Commercial Connections _____________________________________

Number of Industrial Connections _______________________________________

Average Daily Production (MGD) _______________________________________

Average Daily Residential Usage (MGD)* _________________________________

Average Daily Commercial Consumption (MGD)* ___________________________

Average Daily Industrial Consumption (MGD)*_____________________________

**In systems operating without water meters, these figures will have to be approximated. An estimate of 85 gals/day per capita for residential may be used.*

Estimated Quantity (MGD) Used for Public Benefit, Unbilled ________________

Unaccounted for Water (Production Minus Consumption)** _________________

Highest Recorded Demand (MGD), Last 12 Months __________ Date ________

Lowest Recorded Demand (MGD), Last 12 Months __________ Date________

*** Unaccounted-for-water may include unmetered connections and connections with old meters.*

B. Compliance History

Summarize the facility's SDWA compliance history (e.g., contaminant or treatment technique violations, dates of non-compliance) and describe the way in which each particular compliance problem might be best resolved (e.g., by installing new technology, by enhancing process control monitoring). Some of this information may be obtained by reviewing notices of violation (NOVs), inspection reports, or other regulatory agency correspondence. ***The purpose of this section is to identify high-priority capital improvements or other expenditures that might be necessary to address any regulatory deficiencies.***

Problem	Proposed Solution
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

II. Operations and Maintenance

The following section relates to the age, condition, and capacity of individual facilities. The first part of this section is related to any groundwater systems and the second part relates to surface water systems. If the system uses groundwater (well water) exclusively, complete only section A. If source water is taken from surface supplies (streams, lakes, impoundments, rivers, etc.) or from groundwater supplies that have been determined to be under the influence of surface water, complete only section B. If both groundwater and surface water sources are used, complete both sections.

A. Groundwater Systems

1. *Basic System Information*

Complete the following chart with information about each well used by the system. If the system has more than four wells, copy this page and complete the chart for all wells.

	Well __	**Well __**	**Well __**	**Well __**
Source Physical Components				
Age				
Casing type (single or double and material type)				
Casing diameter				
Depth				

	Well __	Well __	Well __	Well __
Source Physical Components (cont)				
Screened (yes or no) / type				
Source water aquifer - confined or unconfined?				
Water Quality				
Potential contamination sources (yes or no) or subject to flooding (yes or no)?				
Source water protection plan? (yes or no)				
Wellhead protection program? (yes or no)				
Under the influence of surface water? (yes or no)				
Raw water quality concerns (list)				

	Well __	Well __	Well __	Well __
Water Quantity				
Daily permitted withdrawal				
Actual yield				
Daily permitted withdrawal divided by actual yield **(Divide average daily production from all wells by total permitted withdrawal. If the answer is greater than 0.9 (that is, actual yield is greater than 90 percent of permitted withdrawal) then additional sources, or more liberal withdrawal permits, may need to be obtained.)**				
Drawdown testing program (yes or no). If yes, frequency?				
Treatment Systems				
Types of treatment currently provided (list)				
Additional or other treatment required (list)				
Age of major components and expected lifespan (design life)				

	Well __	Well __	Well __	Well __
Treatment Systems (cont)				
Capacity (GPM or MGD)				
Does treatment capacity meet highest demand (yes or no)?				
Treatment process produces finished water in 100% compliance with SDWA (yes or no)? If not, why not?				
Are written Standard Operating Procedures available for all treatment processes?				
General condition of treatment system: • Corrosion? • Leaks? • Electrical or mechanical defects?				
Treatment plant subject to flooding? (yes or no)				

	Well __	Well __	Well __	Well __
Treatment Systems (cont)				
Noted safety hazards				
Adequate containment provided for chemical spills (yes or no)?				
Adequate alarms available (e.g., alarm recording telephone or SCADA)?				
Recent major maintenance performed. Indicate type (e.g., preventive, corrective, emergency) and date performed.				
Rehabilitation or maintenance needed? (list)				
Adequate equipment redundancy? *(*see note below)*				

**Adequate redundancy means that each critical component of the treatment train is backed up by other similar components, or that the process stream can be redirected in such manner that treatment may continue without significant interruption, despite the "out-of-service" status of a particular piece of equipment or unit process. Depending on the piece of equipment, this could mean having a second pump in storage on-site or maintaining the telephone number of a rental company or contractor that could provide the equipment in an emergency situation.*

2. Pumps and Pumping Equipment

Complete the following chart with information about each pump used in conjunction with the groundwater system. This includes raw water pumps, finished water pumps, well pumps, booster pumps, and all other pumps used in the system *(excluding chemical feed pumps)*. If the groundwater system has more than four pumps, copy this page and complete the chart for all source pumps.

	Pump __	**Pump ___**	**Pump ___**	**Pump ___**
Pump application (e.g., supply, booster)				
Pump type (e.g., submersible, line shaft)				
Status (active, inactive, or standby)				
Age				
Method of control (e.g., manual, timer, pressure-level, or other)				
Current condition of pump (as designed, unreliable, out of service, needs replacement, new, or other)				
Condition of electrical power and controls (as designed, unreliable, out of service, needs replacement, new, or other)				

	Pump __	Pump ___	Pump ___	Pump ___
Hours per day of operation (average and maximum)				
Capacity (design and current, in GPM)				
Provided with adequate appurtenances (e.g., isolation valves, master meter, blow-off, check valve)				
Date of last pump test				
Results of last pump test				
List recent maintenance performed				
Describe rehabilitation or maintenance needed				
List reasons why pump is performing at less than rated figures				

3. *Corrective and Emergency Maintenance*

Complete the following table to describe any unplanned corrective or emergency maintenance procedures, requiring more than four person/hours labor, performed on the system's wells during the last year.

Maintenance procedure performed	Cause of problem	Cost of replacement parts	Cost of contract assistance (if any)

1. Are all conditions requiring corrective and/or emergency repairs, and an explanation of their probable causes, recorded in a timely fashion in the plant's operating log? Give one or two examples.

2. Did any of the conditions cited in the previous table(s) result in violations of the Safe Drinking Water Act? If so, explain, with dates. (Use separate sheets if necessary.)

3. Does the facility take into account the previous year's record of unplanned corrective or emergency repairs made to pumps/pumping equipment, and their labor and spare parts costs, into cost estimating for the next budget cycle? Is there an historical record of such repairs, so that trend charts for emergency spending may be developed? (e.g., if the facility has, on average, spent $15,000 on corrective or emergency repairs made to the facility's pumps in the previous few years, is $15,000 built into the budget for the next year?)

4. Are there any conditions that exist **right now** which you consider potential emergencies? Might any of these conditions lead to violations of the Safe Drinking Water Act or to catastrophic failure of an essential component of the system or to accident hazards to staff or the public?

5. Have any critical emergency repairs been stalled or severely slowed down by the absence or scarcity of necessary spare parts? If so, what precautions have been taken to protect against this situation in the future?

B. Surface Water Systems

1. Basic System Information

Complete the following chart with information about each surface water source used by the system. If the system has more than four sources, copy this page and complete the chart for all sources.

	Source __	**Source __**	**Source __**	**Source ___**
Surface Physical Components				
Type (river, spring, lake, etc.)				
Number of intake points				
Intake screened? (yes or no)				
Water Quality				
Potential contamination sources (yes or no) or subject to flooding (yes or no)?				
Source water protection plan? (yes or no)				
Raw water quality concerns (list)				

	Source __	**Source __**	**Source __**	**Source ___**
Water Quantity				
Permitted withdrawal (see permit conditions)				
Actual withdrawal: ▪ Average withdrawal (daily) *and* ▪ Maximum withdrawal (daily)				
Minimum stream flow during drought conditions				
Treatment System				
Describe the treatment process. (Diagram on a separate sheet if necessary.)				
Name and age of major components: ▪ basins, ▪ filters, ▪ chlorinators, aerators, ▪ pumps, ▪ chemical feed equipment, ▪ etc.				

	Source __	Source __	Source __	Source ___
Treatment Systems (cont)				
Production capacity, GPM or MGD				
What is current maximum production capacity? Does this treatment capacity meet highest demand?				
How many hours/day must the plant operate to meet typical demand?				
Does the treatment process produce finished water in 100% compliance with the SDWA? If not, why not?				
Are written Standard Operating Procedures available for all treatment processes?				

	Source __	Source __	Source __	Source ___
Treatment Systems (cont)				
Is treatment plant(s) subject to flooding?				
General treatment plant(s) condition: ▪ corrosion? ▪ leaks? ▪ electrical or mechanical defects? ▪ dirt, grime or chemical spillage? ▪ paint? ▪ other?				
Adequate containment provided for chemical spills? (yes or no)				
Adequate equipment redundancy? *(*see note below)* Needs?				
Alarm systems adequate? (SCADA, alarm recording telephone, etc.)				

**Adequate redundancy means that each critical component of the treatment train is backed up by other similar components, or that the process stream can be redirected in such manner that treatment may continue without significant interruption, despite the "out-of-service" status of a particular piece of equipment or unit process. Depending on the piece of equipment, this could mean having a second pump in storage on-site or maintaining the telephone number of a rental company or contractor that could provide the equipment in an emergency situation.*

2. *Pumps and Pumping Equipment*

Complete the following chart with information about each pump used in the surface water system. This includes raw water pumps, finished water pumps, well pumps, booster pumps, and all other pumps used in the system *(excluding chemical feed pumps)*. If the system has more than four pumps, copy this page and complete the chart for all source pumps.

	Pump ___	**Pump ___**	**Pump ___**	**Pump ___**
Pump application (e.g., supply, booster)				
Pump type (e.g., submersible, line shaft)				
Status (active, inactive, or standby)				
Age				
Method of control (e.g., manual, timer, pressure-level, or other)				
Condition of electrical power and controls (as designed, unreliable, out of service, needs replacement, new, or other)				
Hours per day of operation (average and maximum)				
Capacity (design and current, in GPM)				
List reasons why pump is performing at less than rated figures				

	Pump __	Pump __	Pump __	Pump __
Provided with adequate appurtenances (e.g., isolation valves, master meter, blow-off, check valve)				
Date of last pump test				
Results of last pump test				
Current condition (as designed, unreliable, out of service, needs replacement, new, or other)				
List recent maintenance performed				
Describe rehabilitation or maintenance needed				

3. *Corrective and Emergency Maintenance*

Complete the following table to describe any unplanned corrective or emergency maintenance procedures requiring more than four person/hours labor performed on the system's surface water sources during the last year.

Maintenance procedure performed	Cause of problem	Cost of replacement parts	Cost of contract assistance (if any)

1. Are all conditions requiring corrective and/or emergency repairs, and an explanation of their probable causes, recorded in a timely fashion in the plant's operating log? Give one or two examples.

2. Did any of the conditions cited above in the previous table(s) result in violations of the Safe Drinking Water Act? If so, explain, with dates. (Use separate sheets if necessary.)

3. Does the facility take into account the previous year's record of unplanned corrective or emergency repairs made to pumps/pumping equipment, and their labor and spare parts costs, into cost estimating for the next budget cycle? Is there an historical record of such repairs, so that trend charts for emergency spending may be developed? (e.g., if the facility has, on average, spent $15,000 on corrective or emergency repairs made to the facility's pumps in the previous few years, is $15,000 built into the budget for the next year?)

4. Are there any conditions that exist *right now* which you consider potential emergencies? Might any of these conditions lead to violations of the Safe Drinking Water Act, catastrophic failure of an essential component of the system, or accident hazards to staff or the public?

5. Have any critical emergency repairs been stalled or severely slowed down by the absence or scarcity of necessary spare parts? If so, what precautions have been taken to protect against this situation in the future?

<u>Summary of System Sources and Treatment</u>

This section is meant to help you evaluate and prioritize the challenges to your system's sources and treatment capabilities. Looking back at the information you provided in preceding sections and your knowledge of the system, summarize defects and deficiencies noted above and then prioritize them according to their justified need. Using the ranking system provided below, complete the table found on the following page.

*Priority Ranking System**

1 =	Issue presents an imminent threat to public health or safety <u>OR</u> issue presents a current Safe Drinking Water Act compliance problem
2 =	Issue presents a potential or future threat to public health or safety <u>OR</u> issue presents a potential or future Safe Drinking Water Act compliance problem
3 =	Issue impacts negatively or could impact negatively system performance or efficiency, but does not present an immediate threat to public health, safety, or compliance with the SDWA
4 =	Issue presents a future threat to the long-term capacity of the system

*Note: Although an issue might be categorized as a "3" or "4" priority today, you can be sure that it will become a higher priority at some point in the future. It is wise to fix these problems sooner rather than later, when more may be at stake and it might cost more to fix.

Priority-Setting Worksheet for Issues Related to Sources and Treatment

ACTION ITEM	PROBLEM / CONCERN	CORRECTIVE ACTION REQUIRED	COST	OTHER RESOURCES REQUIRED	PRIORITY *(see ranking system)*

Priority-Setting Worksheet for Issues Related to Sources and Treatment

ACTION ITEM	PROBLEM / CONCERN	CORRECTIVE ACTION REQUIRED	COST	OTHER RESOURCES REQUIRED		PRIORITY *(see ranking system)*

C. Storage

Too often, finished water storage facilities become a forgotten component of small town water systems. However, these facilities' vulnerability to corrosion and damage from weather—particularly for elevated storage tanks and other above ground installations—makes them particularly susceptible to deterioration and failure. This is especially troubling because storage systems are hugely expensive to replace. Yet many communities fail consistently to invest appropriately in the care and preservation of their standpipes, or elevated storage tanks, until, too late, they discover that corrosion has set in and the facility is beyond repair. Inspections, both inside and outside of tanks, must be a regular feature of storage system maintenance.

Complete the following chart to indicate the status of each major component of the storage system.

Name or other identification of component	________	________	________	________
Physical Components				
Type (elevated, ground-level, etc.)				
Age				
Capacity				
Type of material (steel, concrete, etc.)				
Visible corrosion or other deterioration (yes or no)?				
Type of level control used for storage tank? (e.g., pressure controls, level controls)				
Level controls adequately maintained? (*see note #1 below*)				

NOTE #1: Level controls should be inspected and operated where applicable and calibrated once a year, if necessary. Sensors inside the tank may require more frequent inspections or repairs. Level controls should be verified by a second means, such as a pressure gauge that is read and correlated to water depth. If that depth does not equal the level gauge reading, then a problem may exist and must be corrected.

Name or other identification of component	____________	____________	____________	____________
Physical Components (cont)				
Number of hours of storage (peak demand and average daily demand)? (*see note #2 below*)				
Is there an adequate low-pressure alarm system (yes or no)? (*see note #3 below*)				
Routine Operations and Maintenance				
Date of last internal inspection (*see note #4 below*)				
Date of last external inspection (*see note #4 below*)				
Corrective Maintenance				
Recent maintenance (type and date)				
Rehabilitation/ maintenance needed				

NOTE #2: Optimally, the system should maintain a supply adequate to meet a 24-hour demand.

NOTE#3: An adequate alarm system should be in place to prevent low pressure problems in the distribution system. The alarm should transmit a signal to a location that will insure a timely response.

NOTE #4: The recommended frequency for an inspection of the interior of a metal tank is once every 5 to 8 years, depending on the nature of the environment where it is located. For example, a metal tank located in a corrosive environment (e.g., near a salt water body) will likely require inspection more frequently than a similar tank located in a less corrosive environment. The interior should also be inspected whenever the tank is drained for any other reason. If an inspection of a tank in the system *has not been* conducted in the last 5 to 8 years, the facility should consider including a tank inspection in the upcoming year's scheduled activities. Informal inspections of the exterior of the tank, from a practical standpoint, should be conducted on a monthly basis, or more frequently, if problems are suspected. The inspector should look for signs of leaks, corrosion or vandalism.

D. Distribution Systems

Pipes and valves allow the conveyance of finished (or "potable") water from storage systems to consumers. Normally, almost all of a distribution system is below ground, out of sight. When human resources are in short supply, the distribution system is easily ignored and is often the last component to be serviced; however, this part of the system is, obviously, critical to the adequate and uninterrupted flow of water to customers. And, when the distribution system itself contributes unwanted characteristics to the water—turbidity, unpleasant colors or tastes, possibly dangerous inorganic constituents—relations with customers can quickly become strained, and the public health threatened. Thus a regular schedule of valve exercise, pipe inspections and cleaning, chemical analysis of water taken from remote sampling points, and replacement of aging mains and laterals characterizes every well maintained water distribution system.

1. Piping

Complete the following chart for all major piping used in the distribution system. Duplicate this page if necessary.

Physical Components				
Material type (ductile iron, PVC, steel, etc.)				
Diameter(s)				
Approximate total mileage, or footage				
Ages, newest to oldest				
Routine and Corrective O&M				
Frequency of reported leaks				
Problems corrected during last 12 months				
Problems still uncorrected				

1. What is the minimum operating pressure normally found in the distribution system?* ____
   Where found? ____

   What is the maximum operating pressure normally found in the distribution system? ____
   Where found? ____

   Are there any places in the system where operating pressure is consistently below 35 PSI? If "yes," where?________________________________

   Is the system capable of maintaining 20 PSI even when stressed by worst-case scenarios, such as major firefighting? _________________________

   Has a hydraulic model of the distribution system ever been commissioned? When? What were the results?
   ____
   ____
   ____

*It is desirable to balance system pressures as closely as possible and to keep them in balance during periods of both high and low consumption. Areas of greatly varying pressures may indicate faulty pressure control valving, large leaks, or poor system design. Zones of low pressure above all may indicate an inability to fight fires effectively. Chronic pressure variations greater than 20 percent indicate the need for a computer generated hydraulic model of the system. Adequate system maintenance, particularly of pressure balancing equipment like valves, is a must.
**Taken from the* "Ten State Standards," Recommended Standards for Water Works*, published by the Great Lakes - Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, 1997 Edition.*

2. When was the distribution system last flushed? Is there a set of standard operating procedures for main and lateral flushing? Have there been a significant number of customer complaints about cloudy or rusty water?
   ____
   ____
   ____
   ____
   ____

2. *Valves*

Complete the following chart for all major valves in the distribution system. Duplicate this page if necessary.

	Type of valve (gate, pressure regulating, altitude, relief, blow-off, hydrant, etc.) ______	**Type of valve** ______	**Type of valve** ______	**Type of valve** ______
Diameter range of gate valves				
Pressure ranges of regulating valves				
Number of valves				
Ages (oldest to newest)				
Number of valves currently not functioning				
Problems corrected during last 12 months				
Problems still uncorrected				
Additional valves needed				

1. Briefly describe below the schedule for exercising system valves, identify any valves which cannot be exercised, and describe why.*

____
____
____
____
____
____

2. Describe below the schedule for flushing hydrants and whether the water used for flushing is metered.

____
____
____
____
____
____

*Flushing and regular valve exercise are two important tasks which must not be ignored by the distribution system operator. Valves are quick to bind up from corrosion or encrustation if left too long without being opened and closed on a regular schedule. Too often major leaks cannot be effectively isolated because flow control valves are frozen into their open position by corrosion or encrustation. Regular flushing of mains and laterals is done to reduce sediment build-up and rust, both of which compromise the aesthetic quality of the water and invariably lead to customer complaints.

3. *Pumps and Pumping Equipment*

Complete the following chart with information about each pump used in the distribution system. If the distribution system has more than six pumps, copy this page and complete for all pumps.

	Pump ___	**Pump ___**	**Pump ___**	**Pump ___**	**Pump ___**	**Pump ___**
Pump application (raw water supply, well, booster etc.)						
Type (line shaft, submersible, etc.)						
Status (active, inactive, standby etc.)						
Age						
Method of control (timer, float switch, pressure, manual other)						
Rated capacity, GPM						
Hours/day in operation: average maximum						
Date of last pump test						
Results of last pump test						

	Pump ___	Pump ___	Pump ___	Pump ___	Pump ___	Pump ___
Condition of control panels, power supply: (as designed, unreliable, out of service, needs replacement, etc.)						
Current pump condition (as installed, new, unreliable, out of service, needs replacement, etc.						
Adequate appurtenan-ces? (isolation valves, master meter, blow-off, check valve, etc.)						
Recent maintenance performed						
Rehab or maintenance still needed						
Is pump performing adequately? Why not?						

4. Water Meters

As typical meters age they tend to under-register, so that it becomes cost effective to replace them on a regular basis. Generally, typical water meters begin to show enough under-registration after 12-15 years that replacing them becomes a good investment. For example, assume a 10 year-old meter measures only 9,000 gallons for each 10,000 gallons passing through it, and water is billed to that meter at a rate equal to $40 per 10,000 gallons. Each 1,000-gallon unit of water is therefore worth $4. The value of the lost water is $48./year; the cost of a new residential (⅝ or ¾ inch) meter is usually under $100. The purchase of new meters would, in this case, be equal to an almost 33 percent yield on investment! (Payback in two years, profit in the third.) Master meters are often dependent on electronics (sonic devices, etc.) and should be calibrated by an expert at least every six months. This service is usually rendered by a contractor.

1. Number of metered connections:
   Residential_____; Commercial_____; Industrial_____.

2. Size of meters (in inches or fractions): Residential_____;
   Commercial (size range)______________;
   Industrial (size range)_______________.

3. Average age of meters:
   Residential_____; Commercial_____; Industrial_____.

4. Describe below the strategy used for the replacement of meters once they have reached their useful service life. How many were replaced last year?
   ____
   ____
   ____
   ____
   ____
   ____

5. Describe below the strategy used for testing and calibrating system master meters (raw water transmission, purchased water, treatment-to-storage, storage-to-distribution, any others).
   ____
   ____
   ____
   ____
   ____
   ____

5. Corrective and Emergency Maintenance

Complete the following table to describe any unplanned corrective or emergency maintenance procedures requiring more than four person/hours labor performed on the system's distribution system during the last year.

Maintenance procedure performed	Cause of problem	Cost of replacement parts	Cost of contract assistance (if any)

1. Are all conditions requiring corrective and/or emergency repairs, and an explanation of their probable causes, recorded in a timely fashion in the plant's operating log? Give one or two examples.

2. Did any of the conditions cited above in the table result in violations of the Safe Drinking Water Act? If so, explain, with dates. (Use separate sheets if necessary.)

3. How specifically does the annual record of unplanned corrective or emergency repairs, and their labor and spare parts costs, enter into cost estimating for the next budget cycle? Is there an historical record of such repairs, so that trend charts for emergency spending may be developed?

4. Are there any conditions that exist **right now** which you consider potential emergencies? Might any of these conditions lead to violations of the Safe Drinking Water Act, or to catastrophic failure of an essential component of the system, or accident hazards to staff or the public?

5. Have any critical emergency repairs ever been stalled or severely slowed down by the absence or scarcity of necessary spare parts? If so, what precautions have been taken to protect against this situation in the future?

Summary of System Storage and Distribution

This section is meant to help you evaluate and prioritize the challenges faced by the system's storage and distribution capabilities. Looking back at the information you provided in preceding sections and what you know of the system, summarize defects and deficiencies noted above and then prioritize them according to their justified need. Using the ranking system provided below, complete the table found on the following page.

*Priority Ranking System**

1 =	Issue presents an imminent threat to public health or safety OR issue presents a current Safe Drinking Water Act compliance problem
2 =	Issue presents a potential or future threat to public health or safety OR issue presents a potential or future Safe Drinking Water Act compliance problem
3 =	Issue impacts negatively or could impact negatively system performance or efficiency, but does not present an immediate threat to public health, safety, or compliance with the SDWA
4 =	Issue presents a future threat to the long-term capacity of the system

*Note: Although an issue might be categorized as a "3" or "4" priority today, you can be sure that it will become a higher priority at some point in the future. It is wise to fix these problems sooner rather than later, when more may be at stake and it might cost more to fix.

Priority-Setting Worksheet for Issues Related to Storage and Distribution

ACTION ITEM	PROBLEM / CONCERN	CORRECTIVE ACTION REQUIRED	COST	OTHER RESOURCES REQUIRED		PRIORITY *(see ranking system)*

Priority-Setting Worksheet for Issues Related to Storage and Distribution

ACTION ITEM	PROBLEM / CONCERN	CORRECTIVE ACTION REQUIRED	COST	OTHER RESOURCES REQUIRED	PRIORITY *(see ranking system)*

Overall Summary of Source Water, Treatment, Storage and Distribution (Section II)

Looking back over the two priority-setting worksheets you completed in the previous section, compile one table (provided below), which ranks all of the issues identified under the Operations and Maintenance section of this evaluation (Section II). List all of the "first priority" issues first, followed by the second-, third-, and fourth-ranked issues.

When preparing this analysis, focus on questions of basic adequacy. Is there a sufficient amount of available water, and can it be adequately treated at reasonable cost? Is there enough storage capacity, and is the distribution system in relatively good condition? And what of future needs: is the population of the user area growing faster than your system can accommodate them?

The following section is intended as the place where you, the technicians who run the system, have an opportunity to summarize the problems you face, and the equipment, personnel, and money you will need to solve them.

Overall Summary of Section II

PRIORITY (list all highest-priority issues first)	**ACTION ITEM**	**PROBLEM / CONCERN**	**CORRECTIVE ACTION REQUIRED**	**COST**	**OTHER RESOURCES REQUIRED**

Overall Summary of Section II

PRIORITY (list all highest-priority issues first)	**ACTION ITEM**	**PROBLEM / CONCERN**	**CORRECTIVE ACTION REQUIRED**	**COST**	**OTHER RESOURCES REQUIRED**

Overall Summary of Section II

PRIORITY (list all highest-priority issues first)	**ACTION ITEM**	**PROBLEM / CONCERN**	**CORRECTIVE ACTION REQUIRED**	**COST**	**OTHER RESOURCES REQUIRED**

III. Management and Administration

The following section asks a number of fundamental questions about management capacity and capability, because water systems, whether publicly or privately owned, are enterprises that must be operated by a set of rules and procedures, like any business. Smaller, non-urban water systems are management intensive, in the sense that they require the care and attention of dedicated managers who must divide their time among many functions—rate management, personnel decisions, SDWA compliance, financing, public information, operations and maintenance, safety management, record keeping, and even emergency response planning.

A. System Sampling and Testing

Finished water must be sampled to check for contamination. Performance of required water sampling demonstrates compliance with the drinking water regulations. In addition systems sample water for process control. Process control sampling enables operators and managers to identify and correct potential problems before they negatively affect water quality.

1. Regulatory Compliance

Complete the following table with information related to the regulatory compliance sampling you perform.

Test Parameter(s) Required	Laboratory Used	Frequency of Test (per year)	Cost of Test	Total Yearly Cost

1(a). How many violations of the Safe Drinking Water Act did the system record during the last 12 months? Specifically, what were those violations? Did any require public notification?

1(b). Briefly describe your system's annual Consumer Confidence Reports. What is the format and delivery method (e.g., mail, newspaper)? Give the date the last such report was issued.

1(c). Has the state regulatory agency that monitors and inspects public drinking water supplies imposed any special sampling or testing requirements on your system? What are they? Why were they imposed?

2. Process Control

Complete the following table with information related to the process control sampling you perform.

Test Parameter(s)	**Sample Locations**	**Frequency of Tests**	**Problems Indicated**

2(a). Is the process control test program adequate to allow troubleshooting and performance optimization of each unit process?

B. Preventive Maintenance Management

Effective preventive maintenance enables operators and managers to avoid the problems that occur when equipment fails or operates inefficiently. Additionally a properly planned and managed preventive maintenance program, including appropriate building and grounds maintenance, reduces the likelihood of accidents and costly unplanned repairs.A quality maintenance program requires adequate staffing and budgeting, but reaps many long-term benefits for the utility system.

1. Is there a documented PM program in use which covers the following:
    a. Sources? ____________________
    b. Treatment? ____________________
    c. Storage? ____________________
    d. Pumping? ____________________
    e. Distribution? ____________________

2. Describe the type of PM program being utilized (e.g., card file, computer-based).

3. Is the PM schedule in accordance with manufacturers' recommendations? If not, explain how PM is scheduled.

4. In general, what PM is conducted by:

    a. In-house staff?
    ____

    b. Outside contractors?
    ____

5. Is an inventory of critical spare parts maintained?

6. Are PM tasks scheduled and performed on a priority system? Please explain how this is done.

7. Is there a backlog of priority PM tasks that have not yet been accomplished? If so, explain what they are and why they not yet been accomplished (e.g., lack of personnel, lack of resources).

C. Safety

Safety must be actively and aggressively managed. Every water system should have a minimum of 24 hours of safety training annually, and attendance should be mandatory. Every employee should be trained to spot and remove hazards, use tools safely, effectively put on and use PPE, and generally respect all unavoidable threats to his/her personal safety—stray electricity, slippery floors, inadequate tools, fire, etc.

1. Has an official safety policy statement been endorsed by the top management of the utility?

2. Are employees trained and retrained in proper safe work practices? Give specific examples.

3. Are all accidents and injuries thoroughly investigated to determine their cause, and are accident reports kept on file for at least 10 years?

4. Does the utility have a hazard communication program that complies fully with Worker Right-to-Know laws?

5. Are employees supplied with all necessary Personal Protection Equipment (PPE) before undertaking hazardous duties? Give examples.

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6. Is there a Confined Space Entry training program? Who does the training, and what are the trainers' specific qualifications?

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7. Is there a vehicle safety and driver training program? How many hours? Taught by whom?

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8. Has the Occupational Safety and Health Administration, or its state equivalent, ever inspected the water plant? Why? Summarize the agency's report.

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9. Are Material Safety Data Sheets for all hazardous materials in use at the plant readily available to all employees?

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10. When was the last lost time accident involving a system employee? Outcome? Workers' Compensation eligible? Cause?

11. Does the facility have a Traffic Control program in place?

12. Does the facility have a Lock-Out/Tag-Out program in place?

13. Does the facility have an Excavation Safety program in place?

14. Are appropriate records kept to document training in proper safe work practices? Give specific examples.

D. Emergency Operations

Increases in civil disorder, vandalism, terrorism, toxic spills and employee strikes, as well as the ever present danger of natural calamities, all suggest that detailed contingency planning be made an integral part of the utility management function. Indeed, some state regulatory agencies now require the creation and annual updating of Emergency Operating Plans for all public water supply systems. Preparation for any of these risks should be the specific obligation of every utility manager. At a minimum you must identify the key system components, or resources, whose loss during an emergency would be primarily responsible for system failure. If the risk is high, these components must have back-up (redundancy).

1. Has the utility completed a vulnerability assessment of its source water and associated hardware, treatment plant and distribution network? Where is the report?

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2. Are there specific, written plans of action for responding to risks of danger to the system? Where are these emergency response plans? Has response been coordinated with local law enforcement, Civil Defense agencies, and other public safety organizations?

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3. Is the utility able to connect to another water system during emergencies, thereby preserving service? Where is the interconnection, and how is it implemented?

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4. Is the system's on-site electrical generating capacity sufficient to power the system during extended loss of electrical service?

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5. Is there a sufficient store of supplies and materials (chemicals, lubricants, etc.) to carry the utility during an extended emergency?

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E. Cross-Connection Control Program

Cross-connections between potable and non-potable water pose a significant risk to health and must be prevented through the implementation of an effective cross-connection control program. Periodic sanitary surveys and appropriate correction of deficiencies can prevent the risk of contamination of drinking water because of cross-connections.

1. Is a written cross-connection control program in place? If so, is it enforced?

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2. Are backflow preventers at treatment plants and other facilities owned by the community tested regularly?

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How often?

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By a certified tester?

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3. Is there a program to control the use of fire hydrants to prevent pressure reduction and corresponding potential contamination problems?

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F. Conservation Programs

Utilities should implement and encourage water conservation measures. Water is a limited resource, and drought and overuse have created water shortages in many areas. Each water system has a limited capacity to treat and serve water. Energy costs to pump water out of deep aquifers can be a huge burden for water systems. Reducing water use enables systems to conserve their resources for withdrawing, treating, and delivering finished water. This usually translates into lower water costs for consumers also.

1. Does the facility have a water conservation program in effect? If so, what are the annual water savings? How could the program be improved to increase the amount of water savings? (Document in cost savings or gallons reduced.)

2. Does the facility have an energy conservation program in effect? If so, what are the annual energy savings? How could the program be improved to increase the amount of energy savings? (Document in cost savings or kWh reduced.)

G. Organization and Staffing

Workforce stability within publicly-owned utility systems traditionally has been lacking, due probably to the generally lower salaries paid in the public sector. One technique for procuring and keeping good employees is to maintain a reliable organization and staffing system, where productive employees are rewarded with salaries comparable to those paid by other progressive communities, where personnel policies are open and well known, and above all fairly administered, and where each individual understands his or her role in the overall organizational scheme of the system.

1. Is there a written organization and staffing plan, with a clearly defined chain of command and reporting protocol?

2. Does each of the job slots identified in the staffing plan have a written position description?

3. Are all of the individuals holding positions which call for state certification or licensing correctly certified? If not, are they in the process of becoming certified? If not, why?

4. Are there written employment policies and procedures, covering (a) compensation, (b) hiring policies, (c) training and certification, (d) discipline and appeal procedures, (e) employee performance evaluations, (f) assignment of shifts, and (g) personnel records management?

5. If a collective bargaining agreement is in force, do you know when it is due to be renegotiated, and who is covered by it?

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H. Long-Term Planning

System management needs to guard against short-sightedness. It is important to consider issues like future demand, inflation, equipment replacement needs, and revenue requirements when making long-term plans. Long-term planning will help to ensure that your utility can meet your community's needs for a safe and adequate water supply.

1. Is life cycle planning adequate to prevent the failure of any critical system component? ("Life cycle planning" means looking at an asset throughout its useful life. For example, how many years can you expect the item to last? When will maintenance be necessary? Can maintenance be performed when it does become necessary? Are there funds set aside to replace the asset when it does ultimately fail?)

2. Is the capacity of the system regularly evaluated to determine if it is capable of addressing growth of the community?

3. Is system planning adequate to address future state and federal regulations?

I. Public Relations

*The public's perception of a utility often determines how that utility will be treated at budget time. Good public relations are the result of consistent and well thought out **outreach** to a system's customers—deliberate efforts to interest them in supporting the utility politically and financially. This effort must be cleverly planned and managed.*

1. Are there clear and written policies for dealing with the media, particularly during emergencies? Has staff been trained on those policies?

2. Are there clear, written policies and procedures for receiving and responding to customer complaints and other communications from the public?

3. Are there ongoing efforts to train system staff in how to project a good public image on behalf of their utility? Briefly describe.

4. Are system telephone numbers and other contact information clearly displayed on bills, newsletters and other public documents?

5. Is there a newsletter? Do senior staff undertake public speaking engagements on behalf of the utility? Are plant tours offered for school and other groups? Are there public meetings at which customers may ask questions about operations and SDWA compliance, particularly in response annual Consumer Confidence Reports?

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J. Record Keeping

Effective utility management virtually demands an accurate and reliable record keeping system, both to satisfy legal requirements and to be able to manage responsibly. Good records can save time when trouble develops and stand as proof that problems were identified and resolved. A treatment plant can only be well run when its operating records are used as the basis for process decisions, and when maintenance records are used for preparing future preventive maintenance cost estimates. If there are legal questions about the operation of the plant, accurate and complete records will provide evidence of what actually took place, what procedures were followed and who was in charge. Finally, good operating records provide an excellent basis for the design of future expansions, or other changes to the system. They are indispensable.

1. Are there up-to-date equipment maintenance records, with associated work orders and equipment control cards, which clearly show the make, model and maintenance history of each piece of plant equipment?

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2. Are plant operations logs up to date, and do they record all the significant daily and monthly operating records required by law for a water treatment and distribution utility?

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3. Are requisitions and purchase orders used for procurement of repair parts and supplies, and are copies of these procurement documents kept on file for at least two years after receipt of the purchased items?

4. Is there a record system for parts and supplies in inventory? Does the system show how often a particular item or part is needed, so that costs can be held down by only keeping on hand only the quantity for which a demonstrated need exists, or those which are vital in an emergency?

5. Does the personnel record system adequately document every personnel action taken on behalf of, or against, employees, thus providing a complete chronological record of an individual's accomplishments and commendations, formal performance reviews, certifications earned, written warnings and disciplinary actions, injury and accident reports, and training attended? Are documents accounting for time worked adequate to review and assess current and future staffing needs?

Summary of System Management and Administration

This section is meant to help you evaluate and prioritize the challenges faced by the system's management and administrative resources. Looking back at the information you provided in preceding section and what you know of the system, summarize defects and deficiencies noted above and then prioritize them according to their justified need. Using the ranking system provided below, complete the table found on the following page.

*Priority Ranking System**

1 =	Issue presents an imminent threat to public health or safety OR issue presents a current Safe Drinking Water Act compliance problem
2 =	Issue presents a potential or future threat to public health or safety OR issue presents a potential or future Safe Drinking Water Act compliance problem
3 =	Issue impacts negatively or could impact negatively system performance or efficiency, but does not present an immediate threat to public health, safety, or compliance with the SDWA
4 =	Issue presents a future threat to the long-term capacity of the system

*Note: Although an issue might be categorized as a "3" or "4" priority today, you can be sure that it will become a higher priority at some point in the future. It is wise to fix these problems sooner rather than later, when more may be at stake and it might cost more to fix.

Summary of System Management and Administration

ACTION ITEM	PROBLEM / CONCERN	CORRECTIVE ACTION REQUIRED	COST	OTHER RESOURCES REQUIRED		PRIORITY *(see ranking system)*

Summary of System Management and Administration

ACTION ITEM	PROBLEM / CONCERN	CORRECTIVE ACTION REQUIRED	COST	OTHER RESOURCES REQUIRED		PRIORITY *(see ranking system)*

IV. Financial Management

So important is the financial stability of a local water supply utility that this final section of the self-assessment instrument is devoted solely to helping you measure the financial health and fiscal management sophistication of your local system. Water systems must be run as businesses, whether they are owned publicly or privately and, while the private water company is almost always required by its shareholders to earn a profit, public systems must take in enough revenue to be able to **reserve** sufficient funds to cover emergencies, pay debt when revenues fall, and replace aging equipment. These are not easy tasks in today's economy.

A. The Basics

1. Is there an accurate operating budget, and do *operating* revenues equal operating expenditures? (Operating revenues *exclude* all funds earmarked for debt service.)

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2. Is there an annual independent audit of water system accounts by which to prove the accuracy of the operating budget? *(* see note below)*

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3. Is there an operating cash reserve, and is it equal to or greater than one-eighth of the annual operating budget?

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*First and obviously, operating revenues must equal or be greater than expenditures. An operating ratio (operating revenues as compared to operating expenditures) should be at least 1:1 as a basic fiscal requirement; the ratio should be at least 1.125: 1 if the operating cash reserve is included in the calculation. The operations cash reserve is intended to fund short-term emergencies and to smooth out seasonal cash flow fluctuations. The capital cash reserve is for funding emergency repairs to major equipmen, or replacement.

4. Is there a capital cash reserve? Is it equal to or greater than 5% of the total replacement value of the physical plant?

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5. Is the water system budget set up as an enterprise account, separate from the community's general fund, and audited separately?

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6. Is there a capital improvement plan? What is the planning period encompassed by the CIP? Who participates in the annual updating of the plan, and how are priorities set?

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7. How often is the water rate structure officially reviewed? Is there legal provision for water rates to be raised on an as-needed basis, subject to a pre-set ceiling, or according to some index of inflation?

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8. What is the average annual increase in the Operations and Maintenance budget over the last five years? How do these increases compare with inflation rates over the same period? (*see note below)

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*Operations and Maintenance costs for water treatment and distribution will increase in direct proportion to increases in the numbers of customers, increases in the complexity of treatment and the length and volume of distribution and storage systems, and increases in the cost of electricity. As systems age more overtime pay is required, because there are more equipment breakdowns. Small systems are victims of diseconomies of scale, and thus must have a clear understanding of the **real cost** of adding new customers and/or continuing to operate with aging infrastructure.*

9. What is the increase of new customers during the same period, and what percentage of the total customer base do these new (last five years) customers represent?

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10. What is the total number of new jobs added at the water system during the last five years, and what additional payroll burden has been added by these new jobs?

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11. For each of the last five years, what is the approximate percentage of total payroll represented by overtime pay? Is there a significant trend upward?

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B. Budget Analysis

Timely budget analysis will assist administrators and policy makers to make more accurate future budgets. The issues of fairness and sufficiency are particularly important, for they are the basis for the public's perception of the quality of the water system, and for the political leadership's acceptance of its rate structure and operating policies. Budget making cannot proceed rationally without good information about historical trends in costs for labor, energy, equipment and supplies.

1. Does the system routinely do an analysis of line item expenditures, so that specific annual costs (labor, energy, etc.) may be compared to those from past years?

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2. Does the system routinely analyze its revenue stream, so as to be able to compare, from month to month and year to year, its budgeted revenues to revenues actually received? What are the categories of revenue included in the analysis?

3. Does the system regularly calculate its operating ratio? How often?

4. Does the system regularly calculate net monthly (or quarterly) operating charges by **type of connection**, so that it may allocate net operating costs according to the total system demand originating for each type of user (e.g. residential, industrial, commercial, etc.)

5. Is there a separate capital budget, based on future per capita consumption estimates, known capital replacement needs (as outlined in a CIP) and other forecasts in local and regional planning documents?

6. Can the system show the **fairness** of its rate structure, by showing that it is recovering costs from customers in precise proportion to the cost of service to those customers? In addition to the basic customer categories of residential, commercial and industrial, what other customer categories are included in the rate structure?

7. Can the system show the **sufficiency** of its rate structure, by showing that it is generating adequate funds for all the O&M, capital and debt service needs of the system?

8. Have system administrators compared the cost of their water (a) to the state-wide average, in both metro and non-metro areas, (b) to the cost in nearby communities or service districts, and (c) as a percentage of median household income? Is the cost appropriate and in line with what others are charging?

9. What is the debt service **coverage ratio** of the budget (total revenue **minus** operating expenses, divided by all debt service expenses)? Is there any required coverage ratio imposed by specific lenders?

10. Has the general fund of the community had to lend funds to balance the water system enterprise fund at the end of any fiscal year in the last five? Why?

C. Rates

1. Is the current rate structure composed of both a **fixed** and **variable** portion, corresponding to recovery of those costs (a) which will not vary significantly with the volume of water produced (labor, debt service, insurance etc.), and those (b) which are principally a function of the volume of water produced (energy, supplies, equipment repair, etc.)?

2. Is the fixed portion of the water rate based on the size of customers' meter connections?

3. Is the variable (consumption based) portion of the rate the same or different for different classes of users? How? Why?

4. Are higher rates charged to consumers located outside of the political jurisdiction that owns the system? Differential?

5. As customers use more water, are they charged more per 1000 gallons, or less? Why?

6. Are any special rate structures in place, such as seasonal, contract rates for industry, off-peak rates, incentive rates, etc. Describe.

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7. What is the duration of the present rate structure, and is it “forward-facing,” in the sense that it attempts to recover average costs over a multi-year period?

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8. Are government and institutional customers charged for their water? If given to them, is consumption metered?

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9. Has the rate structure (including connection fees) been adapted to help achieve a specific development goal, such as residential growth, or industrial relocation?

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10. Do any state laws restrict rate setting flexibility for publicly owned systems in your state?

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D. Money Management

1. Does the system have access to an interest bearing account or fund into which deposits of short term excess cash may be made?

2. What percentage of customers' bills are typically more than 90 days overdue? Is there a written delinquent account policy?

3. Are receipts managed according to procedures prescribed by modern accounting practices? Are they deposited daily?

4. Are system bills paid promptly, so that interest charges are avoided? Do cash flow problems occasionally delay bill payment?

5. Does the system have a financial advisor?

6. Does the system routinely refinance debt to take advantage of lower interest rates?

7. Are annual audits performed? Are they performed by an independent auditor? In the course of recent (last five years) annual audits, have there been any audit exceptions? Have the auditor's Management Letters found any exceptions to current management practices?

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8. Are the financial manager(s) regularly trained in asset management techniques?

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9. Are the system managers currently up to date on federal and state grant and loan financing programs and able to take full advantage of them?

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10. What is the community's current bond rating? If below AAA, why?

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<u>Summary of Financial Management</u>

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Summary of Issues Related to Financial Management

ACTION ITEM	PROBLEM / CONCERN	CORRECTIVE ACTION REQUIRED	COST	OTHER RESOURCES REQUIRED		PRIORITY *(see ranking system)*

Summary of Issues Related to Financial Management

ACTION ITEM	PROBLEM / CONCERN	CORRECTIVE ACTION REQUIRED	COST	OTHER RESOURCES REQUIRED	PRIORITY *(see ranking system)*