

# A Study of Water Delivery System Efficiencies

2002-MR-1



State of New York  
Office of the State Comptroller  
Division of Municipal Affairs

**H. Carl McCall**  
**State Comptroller**  
**April 2002**

# STATE OF NEW YORK OFFICE OF THE STATE COMPTROLLER

---

---

## Division of Municipal Affairs

April, 2002

Dear Local Officials,

One of the State Comptroller's top priorities is to establish and maintain a strong partnership between this office and the local governments of New York State. Primary objectives of this partnership are to identify areas where local governments can improve their fiscal operations and provide guidance and services that will assist local officials in making those improvements. Further objectives are to develop and promote short-term and long-term strategies to enable and encourage local government officials to reduce costs, improve service delivery and to account for and protect their governments' assets.

The reports issued by this Office are an important component in accomplishing these objectives. These reports are expected to be a resource and are designed to identify current and emerging fiscally related problems and provide recommendations for improvement. The following is our report addressing municipal water systems operations.

This study was conducted pursuant to Article V, Section 1 of the State Constitution, and further authority vested in the State Comptroller by Article III of the General Municipal Law. We have examined selected activities related to water system operations of several municipalities. The report is a compilation of findings and recommendations from our review. These findings and recommendations have been discussed with local officials, and their comments have been considered in preparing this report.

Local officials have a responsibility to ensure that water system operations are as efficient as possible. They are also responsible for the control of their record keeping practices. In order to fulfill these responsibilities, local officials need to assess risks and design control procedures that address the identified risks in a cost efficient way. Our Office is available to provide assistance upon request.

Respectfully submitted,

*Office of the State Comptroller  
Division of Municipal Affairs*



# State of New York Office of the State Comptroller

---

## EXECUTIVE SUMMARY

Public water systems are responsible for providing a safe and dependable supply of drinking water to their users. There are over 10,000 public water systems in New York State. Various statutes, regulations and programs contribute to the protection and conservation of available water supplies for the beneficial use of the public.

Public water systems are required to complete daily records of their operations and to submit a monthly Water Systems Operation Report to the New York State Department of Health (DOH). This report includes the results of microbiological tests, water production and treatment data and other water system information. Since 1996, NYS Law has required certain community water systems to prepare and provide an Annual Water Supply Statement to their customers. Currently, community water systems serving 1,000 or more service connections prepare a report that includes, among other things, an accounting of the total annual amount of water withdrawn, delivered, and lost from the system and water conservation measures available to customers. This Annual Water Quality Report (AWQR) serves to raise consumer awareness about the quality of water delivered by their water system and the need to protect drinking water sources.

### **Scope and Objectives**

We reviewed water system operations and management controls at eight water systems operated by six municipalities in the Albany, Schenectady, and Saratoga county region for the period January 1, 2000 through December 4, 2001. The purpose of our study was to answer the following questions:

- Do municipal water systems have adequate systems in place to accurately account for and report on the efficiency of their operations?
- Can municipal water systems achieve potential cost savings by reducing unaccounted-for water to acceptable levels?

### **Results of Study**

An effective water accounting system is a necessary first step in controlling water losses and reducing water system costs. The quantity of water or revenue lost from water distribution system will vary depending on how well the system is operated and maintained. The Federal Environmental Protection Agency (EPA) has established an industry goal of ten percent for unaccounted-for water system losses. We analyzed production and consumption data for the water systems that we visited to determine whether the level of unaccounted-for water was reasonable. Due to the lack of residential customer metering in one municipality, and the lack of annual consumption records at another, we limited our analysis to four municipalities that operate five water systems.

Three of these five water systems lost between 3.4 and 9.5 percent of their water, which is less than the EPA standard. The other two systems lost 13.1 and 47 percent of the water they produced. We estimate the value of the excess portion of unaccounted-for water to be \$40,000 and \$1.2 million, respectively.

We verified, on a test basis, the accuracy of each water system's records for water produced, delivered and unaccounted-for, and compared the results to amounts reported in the 2000 AWQRs. Our review revealed record keeping and computer-based information system deficiencies that impair managers' ability to effectively oversee their operations. These deficiencies can ultimately result in undetected and unnecessary water system losses. For example, we found mathematical errors in calculating daily gallons produced, errors in transferring daily production records to monthly reports and missing production records for 66 days at one system. We also noted that water accounting and billing software used by five municipalities does not provide managers with sufficient information to monitor their systems. In addition, none of the six municipalities maintained adequate records to support their estimates of authorized unmetered water use.

Four municipalities in our study did not have a formal water conservation program. Recent drought warnings emphasize the need for local governments and their residents to conserve water. To illustrate the benefits of a water conservation program, we compared two municipalities with similar water systems characteristics. One municipality uses water meters for its residential customers and promotes water conservation through an inclining block rate structure, so that as consumption increases, unit prices increase. The other municipality does neither of these. Although both municipalities provide water to approximately the same number of residents, the system that used meters and other conservation measures produced approximately 44% less water to service its customers. This amounted to over 400 million fewer gallons of water produced.

### **Responses From Local Officials**

Responses from local officials indicated their agreement with the findings and recommendations contained in this report. A summary of their responses is included as Appendix A of this report.

# TABLE OF CONTENTS

	<b>Page</b>
<b>INTRODUCTION</b>	
Background	1
Objectives	2
Scope and Methodology	2
Responses from Local Officials	2
<b>UNACCOUNTED FOR WATER</b>	<b>3</b>
Recommendation	4
<b>WATER ACCOUNTING AND REPORTING SYSTEMS</b>	<b>5</b>
Water Production	5
Metered Water Use	6
Estimated Unmetered Water Use	6
Annual Water Quality Report	6
Recommendations	7
<b>WATER CONSERVATION</b>	<b>8</b>
Recommendations	10
<b>PERFORMANCE GOALS AND MEASURES</b>	<b>11</b>
Recommendation	12
<b>APPENDICES</b>	
Appendix A Responses from Local Officials	13
Appendix B Major Contributors to this Report	16
Appendix C How to Obtain Additional Copies of the Report	17
Appendix D Local Regional Office Listing	18

# INTRODUCTION

## **Background**

Public water systems are responsible for providing a safe and dependable supply of drinking water to their users. The authority to regulate and supervise public water systems operating in New York State lies primarily with the Department of Health (DOH) and the Department of Environmental Conservation (DEC). Various statutes, regulations and programs contribute to the protection and conservation of available water supplies for the beneficial use of the public.

There are over 10,000 public water systems in New York State. The United States Environmental Protection Agency (EPA) classifies public water systems according to the number of people they serve, the source of their water, and whether they serve the same customers year-round or on an occasional basis. Most municipalities operate community water systems, providing water to their residents on a year-round basis.

Public water systems are required to complete daily records of their operations and to submit a monthly Water Systems Operation Report to the DOH. This report includes the results of microbiological tests, water production and treatment data and other water system information.

Since 1996, NYS Law has required certain community water systems to prepare and provide an Annual Water Supply Statement to their customers. In 1996, Federal legislation began requiring most community water systems used by year-round residents to deliver an Annual Water Quality Report (AWQR) to their customers. Currently, community water systems serving 1,000 or more service connections prepare a report that includes, among other things, an accounting of the total annual amount of water withdrawn, delivered, and lost from the system and water conservation measures available to customers. The AWQR serves to raise consumer awareness about the quality of water delivered by their water system and the need to protect drinking water sources.

**Objectives**

The objectives our study were to determine (1) whether municipal water systems have adequate systems in place to accurately account for and report on the efficiency of their operations and (2) whether municipalities could achieve potential cost savings by reducing unaccounted-for water to acceptable levels.

**Scope and Methodology**

To accomplish our objectives, we reviewed water system operations and management controls at eight water systems operated by six municipalities in the Albany, Schenectady, and Saratoga county region for the period January 1, 2000 through December 4, 2001. We spoke with DOH and DEC officials about our study objectives and reviewed relevant laws, regulations, program information and publications. We also obtained and reviewed the 2000 AWQRs for each water system visited and performed such tests that we considered necessary to satisfy our objectives.

**Responses from Local Officials**

We provided draft copies of this report to local officials for their review and comment. Their comments were considered in preparing this final report and are included as Appendix A.

## UNACCOUNTED FOR WATER

All water systems can benefit from a water accounting system to help track water throughout the system and identify areas that may need attention, particularly large volumes of unaccounted-for water. Unaccounted-for water includes losses that usually result from source meter errors, customer meter under-registrations, accounting procedure errors, illegal connections, malfunctioning distribution system controls, storage tank overflows, theft and underground leaks. An effective water accounting system is a necessary first step in controlling water losses and reducing water system costs.

The quantity of water or revenue lost from water distribution system will vary depending on how well the system is operated and maintained. Water systems must pay for all water that they produce. Therefore, lost water may result in unnecessary production costs and the need for higher water rates to generate the necessary income to cover those expenses. The quantity of lost or unaccounted-for water is one measure of a water system's operational efficiency. The EPA has established an industry goal of ten percent for unaccounted-for water system losses. NYS DOH and DEC officials agreed with this standard.

One way that managers can monitor the efficiency of their water systems and help reduce water loss is to undertake periodic audits of their systems. These audits provide a logical accounting for water throughout the production, transmission, and distribution facilities and can help managers determine how much unaccounted-for water is leakage, what portion is due to meter under-registration, and other areas needing improvement. Water audits should identify and quantify all water sources and all metered uses; identify and estimate authorized unmetered uses; and identify and estimate water losses by type. Officials at the six water systems we visited have not done formal water system audits. As a result, they may not have necessary information to effectively measure the efficiency of their water systems.

We analyzed production and consumption data for the water systems that we visited to determine whether the level of unaccounted-for water was reasonable. Due to the lack of residential customer metering in one municipality, and the lack of annual consumption records for metered residential customers at another, we limited our analysis of unaccounted-for water to 2000-year data at the remaining four municipalities that operate five water systems.

The table below summarizes the results of our analysis:

<b>Water System</b>	<b>Water Produced (gal.)</b>	<b>Accounted-For Water</b>	<b>Unaccounted For Water</b>	<b>Unaccounted-For Water (%)</b>
A	3,936,452,400	3,563,523,592	372,928,808	9.5%
B	890,671,000	472,162,911	418,508,089	47.0%
C1	1,328,224,000	1,154,581,339	173,642,661	13.1%
C2	106,577,000	100,272,428	6,304,572	5.9%
D	926,302,500	894,800,934	31,501,566	3.4%
Note: See <i>Water Accounting and Reporting Systems</i> for a discussion of record keeping deficiencies				

We calculated the potential market value of unaccounted-for water in excess of the ten percent standard, using existing water rates. We estimate the value of this excess unaccounted-for water to be \$1.2 million at system B and \$40,000 at system C1. System B officials believe they have identified the cause of their water loss and began taking actions prior to our review to correct the problem. This has included a system-wide meter replacement program as a preliminary step in improving water accountability.

## **Recommendation**

1. Municipal officials perform water audits at least annually to strengthen accountability over their water resources and to assist in identifying cost-effective methods to reduce waste, minimize unaccounted-for water and decrease system demand.

# WATER ACCOUNTING AND REPORTING SYSTEMS

Adequate and accurate records are essential to the effective management of water system operations. Maintaining timely and reliable information concerning a water system's production, metered use, estimated authorized unmetered use, and estimated water losses allows managers to monitor and evaluate the effect of its policies and efforts and to identify areas needing improvement. The ability to produce timely and reliable information about a water system's production, deliveries and unaccounted-for water is essential to management's overall ability to monitor and manage system performance. Unreliable information could negatively impact management decisions concerning issues such as leak detection and repair programs, water demand analysis, capacity development plans, and the effect of water conservation efforts.

We verified, on a test basis, the accuracy of each water system's records for water produced, delivered and unaccounted-for, and compared the results to amounts reported in the 2000 AWQRs. Our review revealed record keeping and computer-based information system deficiencies that impair managers' ability to effectively oversee their operations. These deficiencies can ultimately result in undetected and unnecessary water system losses.

## **Water Production**

Master meters measure the water supplied from sources, storage facilities and treatment plants. They are designed for accountability, rather than sale, of water. Obtaining data from master meters is the first step in determining if a system has unaccounted-for water. We noted that water system staff maintained daily records of water production based upon master meter readings. Our review of water production records at three municipalities identified many inaccuracies. For example:

- Mathematical errors made in calculating daily gallons produced;
- Errors in transferring daily production records to monthly reports; and
- One system lacked production records for 66 days of a five-month test period. This system reported average daily demand of approximately 2.8 million gallons.

As a result of these errors and deficiencies, inaccurate water production figures were reflected in monthly Water Systems Operation Reports submitted to DOH.

### **Metered Water Use**

The water accounting and billing software used by five municipalities with residential service meters does not provide managers with sufficient information to monitor their systems. While the software provided metered consumption figures for individual customers, it did not provide annual consumption totals for all metered customers. Consequently, the ability to efficiently monitor operations through the performance of water audits is reduced. For example, officials at one water system would need to manually add the water consumptions records of approximately 4,000 residential accounts in order to determine total residential consumption. We also noted that due to repeated inaccuracies with computer-processed consumption data at another water system, an official was required to perform the laborious task of manually recalculating the annual water use of all system customers.

### **Estimated Unmetered Water Use**

Authorized unmetered water uses include unmetered public buildings, firefighting, main flushing, water quality and other testing. Inadequate or insufficient records of estimated unmetered water use further diminishes accountability over water resources and limits management's ability to identify and address potential water system problems. The degree to which officials will need to maintain detailed estimates of their unmetered water use will depend upon the number and type of unmetered service connections. Overestimation of unmetered water use can negatively impact managers' ability to detect and correct water system losses.

None of the six municipalities maintained adequate records to support their estimates of authorized unmetered water use. We noted one municipality that simply estimated such use at one percent of water system production. Other estimates provided varied greatly due to the number of activities considered by local officials. As a result, estimates of authorized unmetered water use ranged from 10,000 gallons to 25,000,000 gallons.

### **Annual Water Quality Report**

As a result of the record keeping deficiencies noted above, some municipalities reported erroneous data in their AWQRs. We noted the following:

- Water production and usage amounts figures reflected in the AWQRs of two municipalities were inaccurate. For example, one water system reported water use of 1,257,068,000 gallons while supporting records indicate that 1,154,581,339 gallons were used, a difference of 102,486,661 gallons or eight percent less than reported. Another water system reported metered water sales to other governments of 4,000,000 gallons while supporting records indicate that 6,886,800 gallons were sold, a difference of 2.8 million gallons or 72 percent more than reported.
- The AWQRs for two other municipalities that calculated water use of its metered customers did not include the required accounting of water withdrawn, delivered and lost from the system.

## **Recommendations**

2. Managers should implement control systems to help ensure the integrity and accuracy of water production, delivery and unaccounted-for water information.
3. Controls should be established to help ensure the accuracy of data collected and reported to management, outside agencies and the public.
4. Water accounting and billing systems should provide managers with sufficient information to facilitate their oversight of water system performance.

## WATER CONSERVATION

Water conservation activities reduce the demand for water, improve the efficiency in use and reduce losses and waste of water. To assist local governments in this effort, DEC developed a Water Conservation Manual to advise local officials regarding water conservation techniques that individual suppliers may use to conserve water. The Water Conservation Manual notes that in addition to maintaining a supply-demand balance, a municipality conserving water will realize the following benefits:

- Increased ability to handle emergencies such as drought, mechanical failures, or water contamination;
- Variable cost savings in energy and chemicals from reduced production, treatment and consumption of water;
- Deferment of expenditures for expansion of water supplies or wastewater treatment facilities by allowing an existing water supply and/or wastewater treatment system to serve increasing populations;
- Greater efficiency and increased capacity in wastewater treatment facilities;
- Improved in-stream flows in source water and related water resources and higher quality in wastewater receiving bodies; and
- Alleviation of competing demands for water resources

When designing a water conservation program, it is necessary to have an accurate picture of water demands in order to estimate potential savings. For this reason, a water supply audit, which breaks supplies and demands into all components, followed by a demand projection, is key to an achievable plan. An accurate water audit cannot be accomplished without customer meters and meter records. Every community has special circumstances affecting its water supply and demands. The appropriate plan for one community might differ from that of its neighbor. Careful consideration should be given to the methods benefiting a particular system. For example, older housing might benefit most from a conservation program that replaces plumbing fixtures in existing houses, while a developing region might better concentrate on using low-flow plumbing fixtures in new housing and conservation through landscaping.

Conservation measures often include:

- universal metering
- leak detection and repair
- water accounting and loss control
- costing and pricing
- information and education
- water use audits
- retrofits
- pressure management
- landscape efficiency
- water-use regulation
- integrated resource management
- reuse and recycling

We found that four of the municipalities studied did not have a formal water conservation program. Recent drought warnings issued by DEC to several upstate counties emphasize the need for local governments and their residents to conserve water.

To illustrate the benefits of employing a water conservation program, we compared two municipalities that operate water systems with similar characteristics. Municipality A employed several conservation measures while Municipality B used very few. For example, Municipality A meters its residential customers and promotes water conservation through its use of an inclining block rate structure for residential and commercial customers, designed so that as consumption increases, unit prices increase. Municipality B does neither of these. Because Municipality B did not meter its residential customers or public-use water, we focused on comparing water production levels and water system financing structures. The following table documents the results of our water production comparison:

<b>Data</b>	<b>Municipality A</b>	<b>Municipality B</b>	<b>Difference</b>	<b>% Difference</b>
System(s) Population Served	27,000	27,586	(586)	(2%)
Number of Housing Units	13,069	11,990	1,079	8%
Water Produced (gal.)	925,700,000	1,329,315,300	(403,615,300)	(44%)

Although Municipality A provides water to approximately the same number of residents as Municipality B, it produced approximately 44% less water to do so. While it is not possible to quantify how much of this water “production savings” is directly attributable to water conservation measures employed, the data suggests that they did have an impact on actual water production levels. We noted that Municipality B finances its water system operations primarily through the imposition of real property taxes. A nominal annual charge is also billed to residential customers for their water service. This type of financing structure is inefficient and inequitable because no correlation exists between a customer’s actual water use and their property tax assessment. In addition tax-exempt properties simply pay a nominal annual charge.

## **Recommendations**

5. Every local government should develop a water conservation plan that reflects careful consideration to desired water conservation goals, community needs and water system capabilities.
6. Municipalities should use customer service meters to help improve conservation efforts, leak detection and repair efforts and system water audits.

## PERFORMANCE GOALS AND MEASURES

A key responsibility of government is to develop and manage services, programs, and resources as efficiently and effectively as possible and to communicate the results of these efforts to the taxpaying public. Meaningful performance measurements assist officials and citizens in identifying financial and program results, evaluating past resource decisions, facilitating qualitative improvements in future decisions regarding resource allocation and service delivery options, and communicating service and program results to the community.

Performance measures are developed as part of the strategic planning process and should flow from the mission, goals, objectives, and program activities undertaken with an emphasis on customer service. Performance measures are not designed to report every activity, but rather focus on key goals and objectives. Objective standards, sometimes referred to as benchmarks, provide specificity to a goal by adding quantitative and/or qualitative measures or dimensions. The objective standards associated with each goal add clarity and provide the target around which activities may occur and, ultimately, goal achievement may be measured.

Successful performance measurement systems require a commitment from management and, to the extent possible, the involvement of staff in the development of appropriate measures. There are four types of performance measures: outcome, output, efficiency and informational. Each performance measure should be clearly defined, providing an explanation of the measure and the methodology for its calculation. An effective performance measurement system should satisfy the following criteria:

- ✓ **Results-Oriented:** focuses primarily on outcomes and outputs
- ✓ **Selective:** concentrates on the most important indicators of performance
- ✓ **Useful:** provides information of value to the water system and decision-makers

- ✓ **Accessible:** provides periodic information about results
- ✓ **Reliable:** provides accurate, consistent information over time

We found that the management of each water system visited had not implemented formal performance goals and measures to assist in improving the effectiveness and efficiency of their operations. We recognize that certain activities performed by water system staff (e.g., testing drinking water for various contaminants and reporting the results thereof) are undertaken in accordance with prescribed State regulations. The performance of these activities, in essence, reflects compliance with an externally imposed goal. However, we believe that the management of other key activities and processes would be strengthened by the development of a formal performance measurement system.

A water system's AWQR is one means of communicating the results of certain water system operations to management and the public. It provides certain indicators of a water system's service accomplishments in terms of its outcomes (e.g., non-violation of a maximum contaminant level or other water quality standard) and outputs (e.g., amount of water withdrawn). We note that the management of many municipal water systems throughout the United States use performance measures and targets to assist them in managing their operations and achieving their goals. Examples of such operational performance measures included: average response time to customer complaints; average repair time of emergency main breaks or leaks; and the average number of meters read or service installations made per worker-hours.

## **Recommendation**

7. Municipal officials should work to establish and implement a formal performance measurement system in order to strengthen the management of water system operations. Performance measures should focus on key goals and activities and be externally oriented.

## APPENDIX A

### RESPONSES FROM LOCAL OFFICIALS

A draft copy of this report was sent to each of the six municipalities we studied. We requested that local officials respond, in writing, to the findings and recommendations contained in this report. Five of the six municipalities provided comments, which are summarized as follows:

#### Unaccounted-For Water

**Recommendation:** *Municipal officials perform water audits at least annually to strengthen accountability over their water resources and to assist in identifying cost-effective methods to reduce waste, minimize unaccounted-for water and decrease system demand.*

“We ... hope that your efforts will result in more accurate accounting of lost and unaccounted for water and assist in focusing efforts to reduce the amount lost and unaccounted for water statewide. Water is our most precious resource.”

“We already have good records on water produced. With the metered water consumption, we will then have a firmer estimate of ‘unaccounted-for’ water to compare against the recommended benchmark of less than 10%. Such data can then be made available at reasonable intervals to our pump house personnel and [the] management team for tracking our progress year-to-year.”

#### Water Accounting And Reporting Systems

**Recommendation:** *Managers should implement control systems to help ensure the integrity and accuracy of water production, delivery and unaccounted-for information.*

“While we are fully metered and have computer records available for review there is always room for improvement and a system of checks and balances will always improve accuracy. We have instituted some new controls and computer cross checking to improve our accuracy.”

“All production readings, reports and data, which were historically done on a manual basis, were computerized. This action eliminated arithmetic and data transfer problems noted in the study.”

“The level of ‘unaccounted-for’ water will determine whether better estimates of our un-metered usage must be obtained. Our main un-metered usage is associated with hydrant flushing and use, and other municipal water use, with heavy emphasis on park and DPW usage. It is probably not cost efficient to do studies or to add meters for municipal use if ‘unaccounted-for’ water use meets the target.”

**Recommendation:** *Controls should be established to help ensure the accuracy of data collected and reported to management, outside agencies and the public.*

“I would like to thank your office for including [us] in this study. The shortcomings that you have brought to our (attention) not only impact the A.W.Q.R., their corrections (are) imperative for us to accurately track the progress of our ongoing leak detection program.”

**Recommendation:** *Water accounting and billing software should provide managers with sufficient information to facilitate their oversight of water system performance.*

“Simple issues such as standardized reporting systems and computer management programs are limited in many basics, and in some circumstances of little or no value. One message that was clearly sent was that all municipalities would be served well if there was consistency in standard management practices.”

“We have worked with our computer software vendor to correct programs that generate consumption data. At the same time, we have implemented a second water usage recapitulation process. These two validate each other, insuring the accuracy of our metered usage data.”

“We have budgeted in our 2002-03 budget to change our water/sewer billing system and vendor. The solution will be chosen to accommodate a computer tally of all metered water sales, something that cannot be done except manually today.”

“[The] billing software is capable of providing such data. While it must be provided in a separate report prepared by our Management Information Systems department, it is available when requested.”

## Water Conservation

**Recommendation:** *Every local government should develop a water conservation plan that reflects careful consideration to desired water conservation goals, community needs and water system capabilities.*

“As your audit revealed, [we are] very concerned with water conservation and protection of our water supply. The inclining block rate schedule adopted ... effective January 1, 1997 is testimony to our dedication.”

“Currently, we are in the process of obtaining a D.E.C. Water Conservation Manual and related documentation for the purposes of obtaining the needed methodology to better estimate authorized unmetered usage and development of formal water conservation program.”

“The [Village] currently denotes a section of our Annual Water Quality Report to water conservation. Items referenced include such suggestions as water saving showerheads, repairing toilet and faucet leaks promptly, doing dishes or laundry only when you have a full load and the proper care of your lawn. In addition, the [Village] intends to review the publication on water conservation which was supplied to us by the New York State Comptroller’s Office. Upon review, the [Village] plans to implement a formal and comprehensive Water Conservation Plan.”

**Recommendation:** *Municipalities should use customer service meters to help improve conservation efforts, leak detection and repair efforts and system water audits.*

“Overall, I do feel we are gaining strides in control of our water system and we plan on continuing with the plan we set out on a few years ago. First, was the installation of new, radio sensitive water meters, to increase reading efficiency and to discourage pirating of water. Second, is the upgrading of our filtration plant, which we started April 8<sup>th</sup> of this year and will continue for the next year. Third is to maximize our leak detection program, which we will embark on in 2003.”

## Performance Goals And Measures

**Recommendation:** *Municipal officials should work to establish and implement a formal performance measurement system in order to strengthen the management of water system operations. Performance measures should focus on key goals and activities and be externally oriented.*

“One message that was clearly sent was that all municipalities would be served well if there was consistency in standard management practices. Whereas some municipalities are using best practices, it would be worthwhile for the municipalities to share those practices, as well as for agencies such as DEC to support those initiatives financially.”

“The [Village] already has set high standards for many of the operational performance measures that are referenced in your report.”

## APPENDIX B

### MAJOR CONTRIBUTORS TO THIS REPORT

#### LISTING OF CONTRIBUTORS

Thomas J. Kelly	<i>Chief Examiner</i>
Phyllis Albano	<i>Associate Examiner</i>
Anthony Dolan	<i>Associate Examiner</i>

## APPENDIX C

### HOW TO OBTAIN ADDITIONAL COPIES OF THE REPORT

To obtain copies of the report entitled *A Study of Water Delivery System Efficiencies* call, write or visit our web page:

Office of the State Comptroller  
Public Information Office  
110 State Street, 15<sup>th</sup> Floor  
Albany, New York 12236  
(518) 474-4015  
<http://www.osc.state.ny.us/localgov/>

## APPENDIX D

### LOCAL REGIONAL OFFICE LISTING

#### OFFICE OF THE STATE COMPTROLLER DIVISION OF MUNICIPAL AFFAIRS

Patricia Lamb McCarthy, Deputy Comptroller  
Rosemarie V. Rosen, Assistant Deputy Comptroller  
Steven J. Hancox, Assistant Deputy Comptroller

---

##### **BUFFALO REGIONAL OFFICE**

David H. Slusarz, Chief Examiner  
Office of the State Comptroller  
1050 Ellicott Square Building  
295 Main Street  
Buffalo, New York 14203  
(716) 847-3647 Fax (716) 847-3643  
Allegany, Cattaraugus, Chautauqua, Erie, Genesee,  
Niagara, Orleans, Wyoming  
E-Mail: [Muni-Buffalo@osc.state.ny.us](mailto:Muni-Buffalo@osc.state.ny.us)

##### **SYRACUSE REGIONAL OFFICE**

Debora Wagner, Chief Examiner  
Office of the State Comptroller  
State Office Building, Room 409  
333 E. Washington Street  
Syracuse, New York 13202  
(315) 428-4192 Fax (315) 426-2119  
Herkimer, Jefferson, Lewis, Madison,  
Oneida, Onondaga, Oswego, St. Lawrence  
E-Mail: [Muni-Syracuse@osc.state.ny.us](mailto:Muni-Syracuse@osc.state.ny.us)

##### **GLENS FALLS REGIONAL OFFICE**

Karl Smoczynski, Chief Examiner  
Office of the State Comptroller  
One Broad Street Plaza  
Glens Falls, New York 12801  
(518) 793-0057 Fax (518) 793-5797  
Clinton, Essex, Franklin, Fulton, Hamilton,  
Montgomery, Rensselaer, Warren, Washington  
E-Mail: [Muni-GlensFalls@osc.state.ny.us](mailto:Muni-GlensFalls@osc.state.ny.us)

##### **HAUPPAUGE REGIONAL OFFICE**

John Pollack, Chief Examiner  
Office of the State Comptroller  
NYS Office Building, Room 3A10  
Veterans Memorial Highway  
Hauppauge, New York 11788-5533  
(631) 952-6534 Fax (631) 952-6530  
Nassau, Rockland, Suffolk, Westchester  
E-Mail: [Muni-Hauppauge@osc.state.ny.us](mailto:Muni-Hauppauge@osc.state.ny.us)

##### **ROCHESTER REGIONAL OFFICE**

William Campbell, Chief Examiner  
Office of the State Comptroller  
The Powers Building  
16 West Main Street - Suite 522  
Rochester, New York 14614  
(585) 454-2460 Fax (585) 454-3545  
Cayuga, Chemung, Livingston, Monroe, Ontario,  
Schuyler, Seneca, Steuben, Wayne, Yates  
E-Mail: [Muni-Rochester@osc.state.ny.us](mailto:Muni-Rochester@osc.state.ny.us)

##### **BINGHAMTON REGIONAL OFFICE**

Patrick Carbone, Chief Examiner  
Office of the State Comptroller  
State Office Building, Room 1701  
44 Hawley Street  
Binghamton, New York 13901-4417  
(607) 721-8306 Fax (607) 721-8313  
Broome, Chenango, Cortland, Delaware,  
Otsego, Sullivan, Tioga, Tompkins  
E-Mail: [Muni-Binghamton@osc.state.ny.us](mailto:Muni-Binghamton@osc.state.ny.us)

##### **ALBANY REGIONAL OFFICE**

Thomas J. Kelly, Jr., Chief Examiner  
Office of the State Comptroller  
22 Computer Drive West  
Albany, New York 12205  
(518) 438-0093 Fax (518) 438-0367  
Albany, Columbia, Dutchess, Greene, Orange,  
Putnam, Saratoga, Schenectady, Schoharie, Ulster  
E-Mail: [Muni-Albany@osc.state.ny.us](mailto:Muni-Albany@osc.state.ny.us)