

Wayne County Water and Sewer Authority

Water and Sewer Operations and Wastewater System Cybersecurity

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OFFICE OF THE NEW YORK STATE COMPTROLLER
Thomas P. DiNapoli, State Comptroller

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Report Highlights

Wayne County Water and Sewer Authority

Audit Objectives

Determine whether Authority officials ensured that water and sewer account adjustments and the assessment of penalties were approved and accurately and appropriately billed and collected.

Determine whether officials adequately safeguarded electronic access to the Authority's water and wastewater systems.

Key Findings

- The Authority had unaccounted water totaling 195 million gallons (19.7 percent) in 2016 valued at approximately \$405,000.
- The Authority did not establish a formal process to review or approve water and sewer penalties or account adjustments. We reviewed 77 accounts with penalties and found no discrepancies.
- Officials have not provided employees with cybersecurity awareness training and do not prevent or monitor public disclosure of system information.

Additional sensitive information technology (IT) control weaknesses were communicated confidentially to Authority officials.

Key Recommendations

- Review water reconciliations performed, determine where significant discrepancies exist and timely correct issues. Adopt procedures governing the periodic review of water meters.
- Establish formal policies and procedures for review and approval of the assessment of penalties and account adjustments.
- Provide cybersecurity awareness training to Authority employees and monitor and prohibit the disclosure of system information.

Authority officials agreed with our findings and recommendations and indicated they plan to initiate corrective action.

Background

The Wayne County Water and Sewer Authority (Authority) is an independent public benefit corporation located in Wayne County (County). The Authority was established in accordance with the Public Authorities Law to provide residents and commercial entities within the County with water and sewer services.

The Board of Directors (Board) is composed of nine members who are appointed to three-year terms by the County Board of Supervisors. The Executive Director (Director) is responsible for the Authority's day-to-day operations. The Director of Operations is responsible for managing the water and wastewater systems' day-to-day operations. The Authority purchases water from 12 suppliers.

Quick Facts

Employees	35
Water and Sewer Customers	13,500
2017 Budgeted Appropriations	\$8.79 million
2016 Water Sold	795 million gallons

Audit Period

January 1, 2016 – August 14, 2017

Water and Sewer Operations

What Are the Best Practices or Regulations Governing Account Adjustments, Penalties and Unaccounted-For Water?

Industry best practices require that authority officials establish written policies and procedures to address the approval and documentation process for billing adjustments and the effective enforcement of past due accounts. Effective policies and procedures should provide that adjustments be approved by the board or a designated official independent of the billing and collection process before the adjustment is made, and that sufficient provisions for late fees and penalties are clearly communicated. Authority officials should require that each adjustment is adequately documented, which includes the origination and justification for the adjustment, the amount of the adjustment and the approval date. The billing enforcement process should be formalized to ensure that penalties are equally and consistently applied, and penalties should be periodically reviewed to ensure appropriate and proper assessment.

Unaccounted-for water is the difference between the amount of water purchased and the amount of water billed to customers and other identifiable users for a given period. Authority officials should periodically compare water purchased with water billed and identify whether the difference is caused by recordkeeping errors, leaks, thefts or malfunctioning meters. The Federal Environmental Protection Agency (EPA) has established an industry maximum goal of 10 percent for unaccounted-for water system losses. Water loss results in an expenditure for an authority for which no revenue is received. An effective water accounting system provides for the tracking of use throughout the distribution system and the identification of areas that may need attention. This is a first step in minimizing water losses, reducing system costs and increasing system revenue.

The Authority Did Not Establish Formal Policies or Procedures for Penalties and Adjustments

The Authority did not establish a formal process or procedures for reviewing penalties on water and sewer bills. The Authority does have an informal process for account adjustments, which includes approval by the Executive Director prior to certain adjustments being made (e.g., customer request, significant amount). However, these procedures are not formally documented, and the Authority does not require that all account adjustments be reviewed periodically for appropriateness.

We reviewed 77 accounts (33 percent) where penalties were assessed, and all adjustments made for May 2017. We found that only minor discrepancies existed, which we discussed with Authority officials. However, without the adoption of formal policies and procedures over penalties and adjustments and the independent review of all account adjustments, the potential for penalties

being assessed and not collected or adjustments being made inappropriately is significantly increased and could result in lost revenues to the Authority.

Unaccounted-For Water Was Greater Than the EPA Maximum Goal

While the municipalities that the Authority contracts with to provide water service typically own the lines and mains, the Authority operates these systems as if they were its own. Therefore, the Authority bills customers directly, receives revenues related to service/use, and maintains/repairs/replaces infrastructure. Authority officials stated that because some municipalities have multiple points of entry, master meters have not been installed at every point. While unaccounted-for water is not specifically attributed to each individual municipality (except in the case of known issues within the system), Authority officials can account for water loss within specific regions of the system.

Ultimately, all Authority customers bear the cost of unmetered/lost water through higher rates.¹ The Authority's unaccounted-for water in 2016 totaled 195 million gallons (19.7 percent). Authority officials stated this amount increased significantly from 157 million gallons (16.7 percent) in 2014 and 175 million gallons (18.4 percent) in 2015, due to the acquisition of operations in the Villages of Lyons and Macedon, which have aged systems. While Authority officials stated that they are vigilant in leak detection, there are no formal policies/procedures for auditing meters on a periodic basis which Authority officials could use to create more useful long-term plans, e.g., prioritizing and scheduling meter replacements.

The most important task in reducing unaccounted-for water is to establish the infrastructure, procedures and policies to accurately understand the impact of water loss indicators. Due to the Authority's acquisition of service areas with aging infrastructure, a lack of adequate policies and procedures and master meters at points of sale within the water system, it is difficult to pinpoint where the cause of lost water occurred. Ultimately, this may result in Authority officials spending more time to determine where issues exist. Furthermore, based on the Authority's average cost paid to purchase water from all suppliers during the year, the unaccounted-for water in 2016 resulted in an approximate \$404,000 cost to the Authority for which no benefit was received. This exceeded the EPA's 10 percent goal by 95,963,000 gallons (almost 10 percentage points), costing over \$198,643 (Figure 1).

¹ The Authority has taken into consideration the aged systems of certain municipalities, and subsequently charges these customers a higher rate or has implemented a maximum threshold on the Authority's responsibility for capital improvements.

Figure 1: Unaccounted-For Water and Cost of Lost Water

January 1, 2016 - December 31, 2016	
Water Purchased	990,550,000 gal
Less: Water Sold/Billed	795,532,000 gal
Unaccounted-For Water	195,018,000 gal
Divided by 1,000	195,018 gal
Total Cost of Lost Water at \$2.07 per 1,000 Gallons	\$403,687
Unaccounted-For Water Percentage	19.69%
Cost of Unaccounted-For Water Exceeding EPA Goal	\$198,643

What Do We Recommend?

The Board and Authority officials should:

1. Adopt a formal policy that addresses the assessment and review of penalties on water and sewer accounts.
2. Establish formal policies and procedures regarding account adjustments, and review (or establish a designee to review) all account adjustments.
3. Review water reconciliations performed, determine where significant discrepancies exist and correct issues in a timely manner.
4. Adopt policies and procedures governing the installation of large source water meters, and the periodic testing, reconciliation and replacement of these meters.

Water and Wastewater System Cybersecurity

The Authority maintains computer-based systems to control and monitor water and wastewater flows, levels, pressure and quality characteristics. Officials contract with a third-party vendor to manage the Authority's water and wastewater systems' information technology (IT) components (e.g., computers and network devices). Officials also contract with another third-party vendor to manage the systems' operational technology components (e.g., programmable logic controllers). A disruption to an Authority system could range from a minor inconvenience to serious consequences relating to the health of both employees and water consumers.

How Should Water and Wastewater Systems Be Protected?

The Director and the Board can minimize the risk of disruptions to the Authority's water and wastewater systems by establishing a process for receiving and assessing system cybersecurity alerts; adopting and enforcing a computer and Internet use policy; providing cybersecurity awareness training to all Authority employees at least annually; prohibiting vendors from disclosing information about the Authority's systems; and periodically reviewing publicly available content for information that could jeopardize the systems.

Employees' Internet Use Puts Authority Systems at Risk

The Board last updated its computer and Internet use policy in 2011. However, we found that Authority employees do not adhere to this policy and Authority officials do not enforce adherence to it. Some employees use the Internet during working hours to engage in questionable activities that put the Authority's systems at risk. Specifically, we identified evidence of questionable Internet use on two of the three examined computers (66.7 percent) connected to the Authority's Red Creek Wastewater Plant network. Authority employees used these computers to visit social networking, hunting, music, shopping, academic research, job hunting, travel and real estate websites.

Because these types of websites are commonly used to spread malicious software (malware),² such Internet use unnecessarily exposes the Authority's systems to malware infections. Furthermore, because the two computers are on the same network as the wastewater system and can communicate directly with wastewater system devices if one of the computers becomes infected with malware, the malware could potentially spread to the wastewater system and lead

² Malware refers to software programs that are specifically designed to harm computer systems and electronic data. Malware often causes this harm by deleting files, gathering sensitive information and making systems inoperable. Computer users can inadvertently install malware on their computers in many ways, including opening e-mail attachments, downloading free software from the Internet or merely visiting infected websites.

to it being disrupted or compromised. Lastly, operators use the two computers to log on and access the supervisory control and data acquisition (SCADA)³ system to monitor and make system changes to their wastewater system, which inherently increases the overall risk and impact of a potential compromise of that system.

Employees Have Not Received Cybersecurity Awareness Training

Authority officials have not provided employees with cybersecurity awareness training. In addition, the Authority's IT vendor does not provide education or training as part of its services to the Authority. Without cybersecurity awareness training, employees may not have been aware of the risks of their Internet use and may not be adequately prepared to recognize and respond to malware. This could result in malware infections that lead to a disruption or compromise of an Authority system.

Officials Do Not Sufficiently Prevent or Monitor for Public Disclosure of Authority System Information

The Authority does not prohibit its third-party vendors from disclosing information about the Authority's water and wastewater systems. The service level agreements between the Authority and its vendors do not contain terms specific to information disclosure, and officials do not periodically review publicly available content for inappropriate disclosure. We performed a limited search on the Internet for publicly available information about the Authority's water and wastewater systems and provided the results to Authority officials. Individuals with malicious intent commonly search the Internet for system details while planning their attacks. Exposing such details unnecessarily provides information to these potential attackers, who could then formulate more focused and effective attacks against the Authority's water or wastewater system.

³ A SCADA computer system gathers and analyzes data in real time and allows operators to monitor their environment and, depending on the configuration, also make changes. For example, operators could monitor and control water flows, levels, pressure and quality.

What Do We Recommend?

The Board should work with the Executive Director and Director of Operations to:

5. Adopt and enforce a computer and Internet use policy that adequately defines appropriate and prohibited activities when using Authority computers and other IT assets.
6. Ensure cybersecurity awareness training is provided to all Authority employees, including water and wastewater operators, at least annually.
7. Ensure terms are included in service level agreements that prohibit vendors from disclosing information about the Authority's water and wastewater systems.
8. Ensure publicly available content on the Internet is periodically reviewed, and ensure the removal of information that could jeopardize the Authority's water or wastewater system.

Appendix A: Response From Authority Officials



www.wcwsa.org

March 14, 2018

Mr. Edward V. Grant Jr.
Chief Examiner
OSC Rochester Regional Office
The Powers Building
16 West Main Street—Suite 522
Rochester, New York 14614-1608

Re: Wayne County Water and Sewer Authority
Audit Response Letter

Dear Mr. Grant,

On behalf of the Wayne County Water and Sewer Authority (WCWSA), I would like to express our sincere appreciation for the time and effort that was expended by the assigned OSC staff members who recently completed an audit of WCWSA operations and wastewater system cybersecurity. We commend your staff for the professional and efficient completion of this examination, along with their patience and understanding of our ongoing building renovation activities.

We are in general agreement with the findings of this examination and we will be responding to the final version of the audit report through submission of a corrective action plan as outlined during our exit interview process.

We found the cybersecurity portion of the audit to be a particularly timely and valuable process in that this extensive review took place during the same time period within which we were being tasked with a cybersecurity vulnerability evaluation as required by the New York State Department of Health.

Several of the cybersecurity audit findings and recommendations have already been completed and we are developing plans to address and implement the remaining items. We are also in the process of scheduling recommended training for all employees on cybersecurity practices and awareness.

Regarding the water and sewer operations portion of the audit, we are pleased to note that this examination has confirmed that our existing internal controls and procedures have been effective in preventing fraud while also providing for proper oversight of our operations.

One key recommendation from the audit suggests adoption of formal policies for review and approval of account adjustments and the assessment of penalties. While the audited transactions revealed no discrepancies, the WCWSA agrees that existing policies should be formally documented. Several suggestions were also made to better control

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and/or prohibit the disclosure of information that could jeopardize WCWSA systems and operations. The WCWSA agrees that this is an important issue that warrants the ongoing attention of Management and Staff with the support of the Board.

In regard to the findings and recommendations pertaining to unaccounted for water, the WCWSA recognizes the potentially significant impact of this component upon water rates and system reliability.

While the EPA has maintained a goal of 10% as a target to strive for in terms of an overall percentage of unaccounted for (or non-revenue) water, the experience of comparable public systems suggests that this goal may be unrealistic to achieve—especially with a system of our age and complexity. Our situation has been compounded in recent years due to the takeover of aged and leaky water systems in the Towns of Lyons, Macedon and Sodus. The WCWSA, as part of its enabling legislation, was created both to develop new water and wastewater systems and to help provide stability to existing water and wastewater systems throughout Wayne County by assuming operations of public systems where that is necessary or in the best interests of the community. That is certainly the case in Lyons and Macedon where dissolution of the former Villages in both communities necessitated assumption of existing operations by WCWSA, since neither Town had its own water department.

During the exit interview, we also explained the contractual provisions that have been put in place in Lyons, Macedon and Sodus to prevent significant impacts upon our overall customer base due to the takeover of these older systems. Clarification was also provided to indicate that all purchase points are master metered and that we currently have a contemporary and appropriate meter testing, calibration and replacement program.

The WCWSA understands that non-revenue water has a particularly significant impact to us since we purchase all of our water supplies. Accordingly, the Authority remains committed to aggressively finding and fixing leaks while continuously bolstering our resources to better monitor and account for water within our systems.

Once again, we wish to thank you for your objective assessment and examination of our operations and cybersecurity, and we shall respond with an appropriate corrective action plan once the final audit report has been issued.

Should you have any questions, please feel free to contact me directly.

Sincerely,

Martin J. Amato
Executive Director, WCWSA

cc: LaVerne Bliet, Chairman, WCWSA

Appendix B: Audit Methodology and Standards

We conducted this audit pursuant to Article V, Section 1 of the State Constitution and the State Comptroller's authority as set forth in Article 3 of the New York State General Municipal Law. To achieve the audit objective and obtain valid audit evidence, our audit procedures included the following:

- We interviewed Authority officials, employees and third-party vendors to gain an understanding of water and sewer billing and collection procedures, as well as its water and wastewater systems and related cybersecurity controls.
- We reviewed adopted water and sewer rates, Board minutes, contracts and written agreements.
- We obtained the penalty reports for the May 1, 2017 billings. Based on our professional judgment, we selected one-third of accounts assessed penalties to determine whether penalties were assessed appropriately at the rate of 10 percent on the current charge, non-compounding. Therefore, we selected every third account of the 232 total accounts (77 accounts, with penalties totaling \$690) to review and recalculate. We reviewed the billing summary report to determine the total current bill for each account, and recalculated the penalty on the charge.
- We reviewed account adjustments for May 2017, which totaled approximately \$450, to determine whether adjustments were appropriate and approved.
- We reviewed a sample of cash receipts collected totaling \$16,397 in the month following our originally selected random billing period of May 1, 2017. We randomly selected three dates (June 1, 2 and 22) during June 2017 to review cash receipts/payments. We determined whether the customer paid timely and penalties should have been charged. We traced payments recorded in the billing system to the cash receipts journal. We then verified that total deposit amounts for cash receipts matched total deposits made.
- We reviewed the Authority's water reconciliation for fiscal year 2016 to determine the amount of unaccounted-for water. We further analyzed the 2016 reconciliation to determine what the cost of unaccounted-for water during this year was to the Authority, based on the average cost paid by the Authority to purchase water.
- We examined Internet use on three computers connected to the Authority's Red Creek Wastewater Plant network.
- We performed Internet searches for publicly available information about the Authority's water and wastewater systems.

Our audit also examined the adequacy of certain IT controls. Because of the sensitivity of some of this information, we did not discuss the results in this report, but instead communicated them confidentially to Authority officials.

We conducted this performance audit in accordance with GAGAS (generally accepted government auditing standards). Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objective. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objective.

Unless otherwise indicated in this report, samples for testing were selected based on professional judgment, as it was not the intent to project the results onto the entire population. Where applicable, information is presented concerning the value and/or size of the relevant population and the sample selected for examination.

Good management practices dictate that the Board has the responsibility to initiate corrective action. As such, the Board should prepare a plan of action that addresses the recommendations in this report and forward the plan to our office within 90 days.

Appendix C: Resources and Services

Regional Office Directory

www.osc.state.ny.us/localgov/regional_directory.pdf

Cost-Saving Ideas – Resources, advice and assistance on cost-saving ideas

www.osc.state.ny.us/localgov/costsavings/index.htm

Fiscal Stress Monitoring – Resources for local government officials experiencing fiscal problems

www.osc.state.ny.us/localgov/fiscalmonitoring/index.htm

Local Government Management Guides – Series of publications that include technical information and suggested practices for local government management

www.osc.state.ny.us/localgov/pubs/listacctg.htm#lmgm

Planning and Budgeting Guides – Resources for developing multiyear financial, capital, strategic and other plans

www.osc.state.ny.us/localgov/planbudget/index.htm

Protecting Sensitive Data and Other Local Government Assets – A non-technical cybersecurity guide for local government leaders

www.osc.state.ny.us/localgov/lgli/pdf/cybersecurityguide.pdf

Required Reporting – Information and resources for reports and forms that are filed with the Office of the State Comptroller

www.osc.state.ny.us/localgov/finreporting/index.htm

Research Reports/Publications – Reports on major policy issues facing local governments and State policy-makers

www.osc.state.ny.us/localgov/researchpubs/index.htm

Training – Resources for local government officials on in-person and online training opportunities on a wide range of topics

www.osc.state.ny.us/localgov/academy/index.htm

Contact

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