

**Performance Audit:
Water Quality Testing**

October 2018

City Auditor's Office
City of Atlanta

File #18.04



CITY OF ATLANTA
City Auditor's Office
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October 2018

Performance Audit:

Water Quality Testing

What We Found

The city has implemented key components of the Safe Drinking Water Act intended to ensure compliance and safe drinking water for its customers. The Department of Watershed Management is responsible for treating and testing the water to ensure that contaminants in tap water do not exceed maximum levels set by law and for reporting water quality results to the state. The department is also responsible for notifying customers if water fails to meet water quality standards.

The city's two water treatment plants use a multi-step process to treat raw water that is consistent with state Environmental Protection Division (EPD) rules. The department has at least one certified operator on duty at all times. Water monitoring occurs continuously using the Supervisory Control and Data Acquisition system (SCADA) and operators sample water to verify the SCADA information. Drinking water plants keep records of water quality, as required by state rules.

The department meets standards for routine testing throughout the distribution system, collecting more samples than EPD requires. The Department of Watershed Management tests on average more than 265 water samples per month - 240 samples are required based on the city's service population. The department maintains a certified laboratory to test samples, consistent with state rules.

While the Department of Watershed Management met its 36-hour target for responding to customer complaints regarding water quality, it does not track and monitor the amount of time to resolve complaints. We could not assess compliance for 6% of the complaints because information entered into the service order management system was either incorrect or missing.

Why We Did This Audit

We undertook this audit because the Department of Watershed Management's Office of Water Treatment & Reclamation had the second highest risk score in our 2017 risk assessment. The office is responsible for operating the city's drinking water plants and storage facilities and complying with all applicable regulatory requirements, including the Safe Drinking Water Act. Our audit reviews the Department of Watershed Management's processes for testing and reporting water quality.

What We Recommended

To ensure timely and accurate resolution of water quality complaints from customers, the Commissioner of the Department of Watershed Management should:

- create a service level agreement to measure the water quality complaint resolution, tracking the time that it takes to resolve the complaint from the date of the customer call
- ensure that work order dates are correctly entered into the service order management system to be able to accurately track performance

For more information regarding this report, please use the "contact" link on our website at www.atlaudit.org

Management Responses to Audit Recommendations

Summary of Management Responses

Recommendation #1: We recommend the Commissioner of the Department of Watershed Management create a service level agreement to measure the water quality complaint resolution, tracking the time that it takes to resolve the complaint from the date of the customer call.

Response & Proposed Action: Create a SLA of a certain number of business days to resolve water quality complaints. We will adjust so that for the associated service request, the start date will be when the call is received, and the end date will be when the issue is resolved and service request is closed. We will review our history of activity as well as any other relevant information to ensure that the SLA is reasonable. **Agree**

Timeframe: December 2018

Recommendation #2: We recommend the Commissioner of the Department of Watershed Management ensure that work order dates are correctly entered into the service order management system to be able to accurately track performance.

Response & Proposed Action: Perform weekly audits of DWQC work orders to ensure accurate and complete data entry. **Agree**

Timeframe: October 2018



CITY OF ATLANTA

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October 1, 2018

Honorable Mayor and Members of the City Council:

We undertook this audit because the Department of Watershed Management's Office of Water Treatment & Reclamation had the second highest risk score in our 2017 risk assessment. The office is responsible for operating the city's drinking water plants and storage facilities and complying with all applicable regulatory requirements, including the Safe Drinking Water Act. The department's Office of Watershed Protection monitors and reports compliance with state and federal regulations independently of operations. Our audit reviews the Department of Watershed Management's process for testing and reporting water quality.

The Audit Committee has reviewed this report and is releasing it in accordance with Article 2, Chapter 6 of the City Charter. We appreciate the courtesy and cooperation of city staff throughout the audit. The team for this project was Randi Qualls, Jamie Amos, and Diana Lynn.

Amanda Noble
City Auditor

Marion Cameron
Chair, Audit Committee

Water Quality Testing

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Introduction

We undertook this audit because the Department of Watershed Management's Office of Water Treatment & Reclamation had the second highest risk score in our 2017 risk assessment. The office is responsible for operating the city's drinking water plants and storage facilities, and complying with all applicable regulatory requirements, including the Safe Drinking Water Act.

Media articles have reported elevated lead levels in drinking water at several Atlanta Public Schools. According to Watershed Management's 2016 Water Quality Report, the city has no lead service lines, but does have some lead joints. The department tests water samples at the source, treatment plants, distribution center, and consumer taps. The department's Office of Watershed Protection monitors and reports compliance with state and federal regulations independently of operations. Our audit reviews Watershed Management's process for testing and reporting water quality.

Background

The City of Atlanta's drinking water system provides approximately 98 million gallons of drinking water per day for more than 1.2 million customers within the city limits and the surrounding metro Atlanta areas, including Fairburn, Union City, and South Fulton. Safety threats to the city's drinking water include chemicals, animal waste, pesticides, underground waste, and naturally occurring substances. Water that is not properly treated or disinfected, or that travels through a distribution system that is not properly maintained, may pose health risks.

The Safe Drinking Water Act Includes "Source to Tap" Safeguards

The city's drinking water is regulated by the federal Safe Drinking Water Act (Act), passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. Initially, the Act focused primarily on drinking water treatment; amendments over the last several decades have included provisions to protect drinking water from the initial intake to the customer's faucet, also referred to as "source to tap."

The Safe Drinking Water Act authorized the Environmental Protection Agency (EPA) to set national standards and regulations for drinking water distribution systems that comply with the Safe Drinking Water Act. The EPA authorized the State of Georgia to directly implement the provisions of the Safe Drinking Water Act because the state agreed to adopt standards at least as stringent as the EPA requires and to ensure that its water systems meet those standards. The state passed the Georgia Safe Drinking Water Act of 1977 (O.C.G.A. Section 12-5-170 through 12-5-193, as amended) to carry this out. The Georgia Environmental Protection Division (EPD), a division of the state's Department of Natural Resources, is responsible for administering and enforcing the provisions of the state's Safe Drinking Water Act. The EPA still maintains oversight over the state's drinking water programs to make sure that the state complies with the Act.

The Safe Drinking Water Act mandates multiple approaches to ensure the safety of drinking water; they include source water protection, treatment, distribution system integrity, and public information. Water systems are responsible for treating and testing the water to ensure that contaminants in tap water do not exceed standards and reporting water quality results to the state. They also are also responsible for notifying customers if it does not meet water quality standards.

To assess the city's drinking water operations against the provisions of the federal and state Safe Drinking Water Act, we reviewed Rules of Georgia Department of Natural Resources, Environmental Protection Rule 391-3-5 et seq., and the state rules and regulations established to implement the Act. While we did not assess every rule of the Safe Drinking Water Act, we assessed rules related to water quality testing, reporting, and public communication.

Prior to treatment, drinking water contains contaminants from a variety of sources (see Exhibit 1). After treatment, drinking water will still contain small amounts of some contaminants that may not necessarily pose a health risk to the general population; however, the Environmental Protection Division prescribes regulations to limit the concentration of certain contaminants. The EPD requires that the city perform tests to sample specific contaminants at the treatment plants and throughout the distribution system. The city prepares annual water quality reports that identify water quality test results. The contaminants regulated by EPD and their maximum contaminant level are shown in Exhibit 2.

Exhibit 1: Contaminants Found in Drinking Water

Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

Inorganic contaminants, such as salts and metals, which can be naturally occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

Pesticides and herbicides, which may come from a variety of sources such as agriculture, stormwater runoff and residential uses.

Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff and septic systems.

Radioactive contaminants, which can be naturally occurring or be the results of oil and gas production and mining activities.

Source: 2017 City of Atlanta Water Quality Report

Exhibit 2: Regulated Testing and Maximum Contaminant Levels

Sample Location	Test	Units	Sample Count	Testing Frequency	Reporting Frequency	Maximum Contaminant Level
Treatment Plants*	Turbidity	NTU	12	Daily	Monthly	1
	Fluoride	ppm	1	Daily	Annually	4
	Total Organic Carbon	ratio	1	Monthly	Monthly	Treatment Technique**
	Nitrate-Nitrite	ppm	1	Annually	Annually	10
	Chlorine	ppm	24	Daily	Monthly	4
Distribution System	Total Coliform	% of samples	240	Daily	Monthly	5
	Chlorine	ppm	240	Daily	Monthly	4
	Trihalomethanes	ppb	12	Quarterly	Quarterly	80
	Haloacetic Acids	ppb	12	Quarterly	Quarterly	60
	Copper	ppm	50	Every 3 years	Every 3 years	1.3
	Lead	ppb	50	Every 3 years	Every 3 years	15

Notes:

*per plant

**TOC is a calculated removal ratio

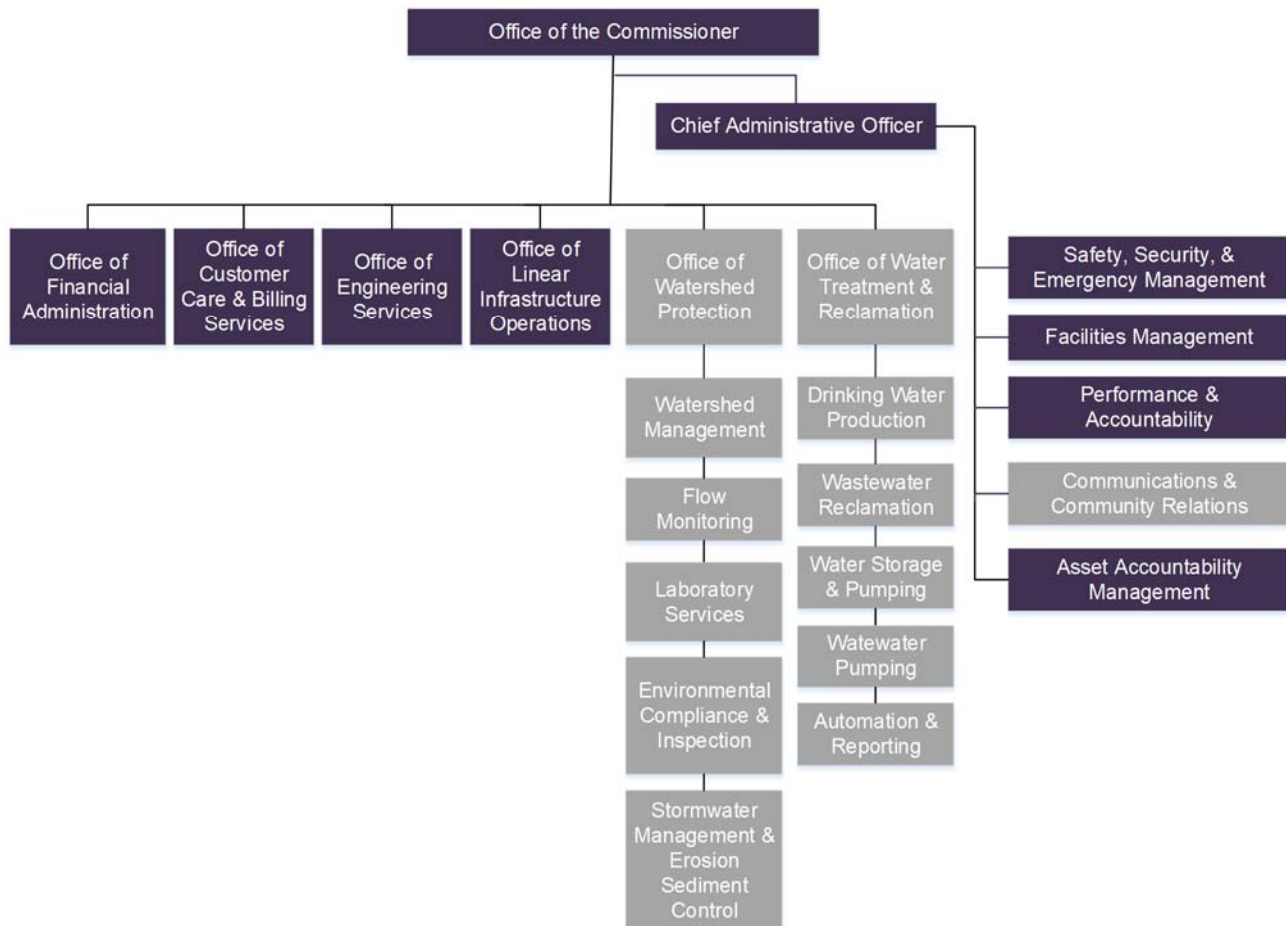
- NTU=Nephelometric Turbidity Units
- PPM=Parts Per Million
- PPB=Parts Per Billion

Source: Prepared by auditors using information from the Department of Watershed Management and the EPD

Three Offices in Watershed Management Have Primary Functions for Water Quality

Three offices within the Department of Watershed Management are primarily responsible for direct compliance with the provisions of the Safe Drinking Water Act, shown in gray in Exhibit 3. The Office of Water Treatment and Reclamation is responsible for operating the city’s drinking water treatment plants, testing water at the source, and testing and treating water at the city’s two water treatment plants. The Office of Watershed Protection operates the water testing laboratories and handles customer-reported water quality complaints. The Office of Communications and Community Relations is responsible for notifying the public of any changes to the city’s water quality, including boil water advisories.

Exhibit 3: Key Offices Handling Water Treatment & Testing



Source: Prepared by auditors using information from the Department of Watershed Management

Water from Chattahoochee is Treated Before It Reaches Customers' Taps

The city's local surface water supply is the Chattahoochee River. The river begins in northeast Georgia and flows south through the Atlanta metropolitan area before ending at Lake Seminole at the Georgia-Florida border. To withdraw water from the river, the city holds a surface water withdrawal permit issued by the Georgia EPD.

About 75 percent of the city's water is processed at two treatment plants: the Chattahoochee Water Treatment Plant and the Hemphill Water Treatment Plant. At the treatment plants, the raw water is treated, filtered, and disinfected through multiple processes. The treated water is piped to customer taps or held in a storage tank as needed (see Exhibit 4 on page 11). Water is treated similarly at both treatment plants.

The remaining quarter of the city's water is supplied by the Atlanta-Fulton County Water Treatment Plant, which also pulls water from the Chattahoochee River. The plant is jointly owned by the City of Atlanta and Fulton County. We did not visit the Fulton County Water Treatment Plant for this audit because it is privately operated by a third-party contractor. The city also holds a permit issued by EPD to operate a public water system - the permit must be renewed every ten years.

The City Monitors the Quality of Water Used by Customers

After treated water enters the public water system and is released to customer taps, the Department of Watershed Management's Office of Watershed Protection routinely collects water samples from designated sampling sites within the distribution system. The samples are intended to be representative of the water quality throughout the system. In addition to the routine testing, watershed protection also conducts event-based testing throughout the system and testing in response to customer complaints about water quality.

Audit Objectives

This report addresses the following objectives:

- Does the city have controls in place to comply with the Safe Drinking Water Act?
 - Does the city meet service level agreements for customer water quality complaints?
-

Scope and Methodology

We conducted this audit in accordance with generally accepted government auditing standards. We reviewed routine distribution monitoring reports for January 2018 through March 2018.

Our audit methods included:

- interviewing regulatory officials within the Georgia Environmental Protection Division and the U.S. Environmental Protection Agency
- interviewing staff from the Offices of Watershed Protection, Water Treatment and Reclamation, and Communications and Community Relations
- reviewing the federal and state drinking water laws and regulations
- touring the Chattahoochee and Hemphill water treatment plants to understand water treatment methods
- observing certified operators and laboratory technicians who conduct water quality testing throughout the treatment and distribution systems
- comparing hard copy laboratory sampling and testing records against information entered into the Department of Watershed Management's internal reporting system, Laboratory Information Management System, and reported to the state
- observing water quality control specialists during an event-based service call
- reviewing the boil water advisory issued for calendar year 2018 to assess compliance with legal requirements

- analyzing drinking water quality complaints from July 2017 through May 2018 to assess whether the department met service level agreements
- observing the tri-annual microbiology laboratory certification conducted by EPD and required by the Georgia Safe Drinking Water Act of 1977

Generally accepted government auditing 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 objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Findings and Analysis

Testing and Treatment Complies with Safe Drinking Water Act

The city has implemented key components of the Safe Drinking Water Act intended to ensure compliance and safe drinking water for its customers. The Department of Watershed Management is responsible for treating and testing the water to ensure that contaminants in tap water do not exceed standards and reporting water quality results to the state. The system also has a responsibility for notifying customers if it does not meet water quality standards so that customers can take appropriate precautions, such as boiling the water before drinking.

The department meets standards for routine testing, collecting more samples than required by the Environmental Protection Division (EPD). Watershed Management tests on average more than 265 water samples - 240 samples are required by EPD based on the city's service population. The Office of Watershed Protection actively seeks out new participants for the EPD-approved sampling plan to increase the number of sampling sites in preparation for when the testing requirements increase due to population size.

Three of the last five annual Water Quality Reports identified levels of total trihalomethanes that exceeded maximum concentrations; however, for the most recent violation that occurred in the fourth quarter of 2017, the city was back in compliance prior to the EPD issuing the violation. According to the National Institute of Health, elevated levels of trihalomethanes have been associated with negative health effects, such as cancer and adverse reproductive outcomes.

The city also received one violation from the EPD for not submitting the 2014 report in compliance with EPD Rule 391-3-5-.41, which requires the city to issue the Water Quality Reports by July 1st of each year. The 2014 report was issued in October and the city has remained in compliance since then.

The Department of Watershed Management issued a boil water advisory in February 2018 for Fairburn, Union City, and South Fulton because of low water pressure. The department is required by the EPA to issue boil water advisories as a safeguard when the water

pressure drops below 20 pounds per square inch or water quality may have otherwise been compromised.

Treatment Plant Operations Comply with Key Provisions of Safe Drinking Water Act

The Office of Water Treatment and Reclamation has implemented significant components of the Safe Drinking Water Act to help ensure compliance and safe drinking water for its customers. The two treatment plants use a multi-step process to treat raw water that is consistent with EPD rules. Also, the department has at least one certified operator on duty at all times. Water monitoring occurs continuously using the Supervisory Control and Data Acquisition system (SCADA) and manual sampling is performed by operators to verify the SCADA information. The city also reports water quality testing results to the EPD as required by state rules and is in the process of enhancing the Operations and Maintenance Plan to improve accessibility and transparency.

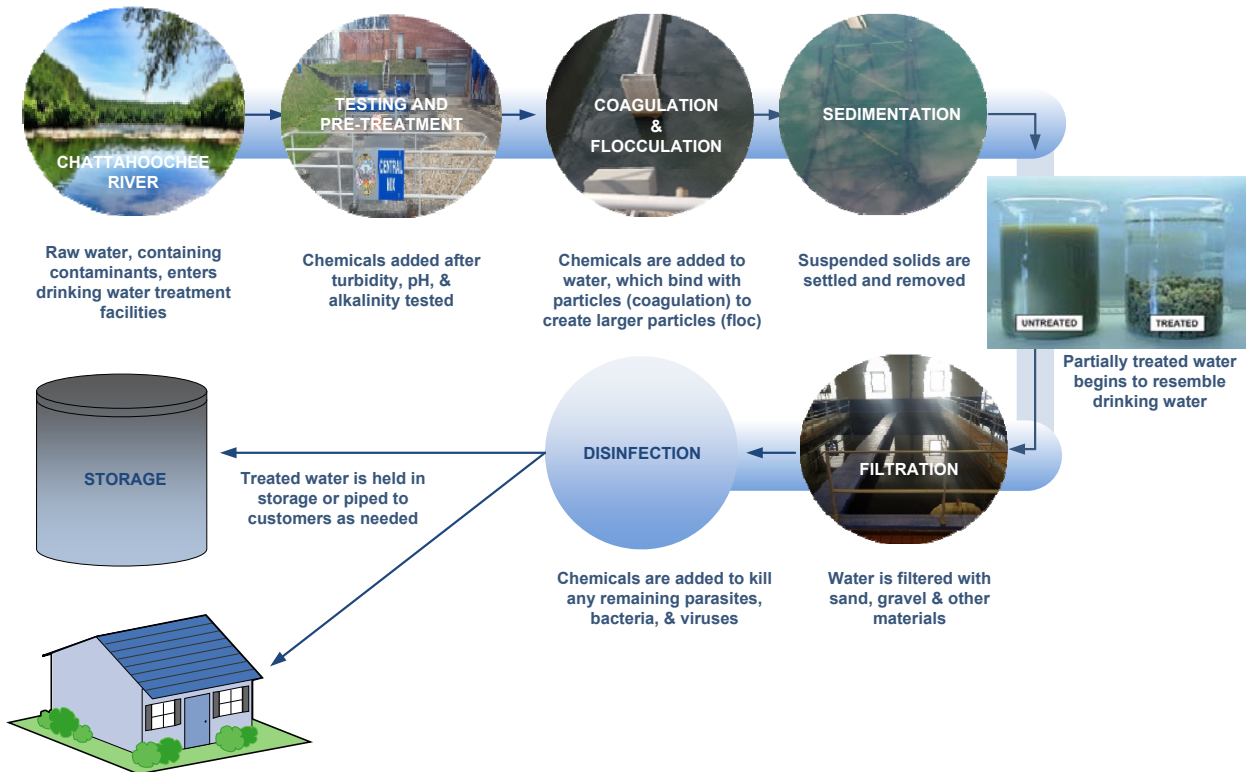
The Hemphill and Chattahoochee drinking water plants treat raw water from the Chattahoochee River primarily through filtration and disinfection, consistent with the Safe Drinking Water Act requirements. The city's two primary drinking water plants use conventional treatment methods of coagulation, flocculation, sedimentation, filtration, and disinfection to treat raw water.

State Rule 391-3-5-.09 (1) states that surface water treatment plants must be designed and have the capacity to treat raw water so that the drinking water complies with the rules. The rule provides that plant treatment methods include means for rapid mixing, flocculation, sedimentation, filtration, and disinfection. The drinking water treatment process begins with tests of the raw water's turbidity, pH, and alkalinity to determine the amount of pre-treatment chemicals that need to be added to the raw water. The water is then treated using a four-step process (see Exhibit 4):

- **Coagulation and flocculation** - chemicals with a positive charge are added to the raw water. The positive charge of the chemicals neutralizes the negative charge of dirt and other particles in the water. The particles bind with the chemicals (coagulation) and form larger particles called floc. Slow-moving mixers agitate the floc for about two hours, which are removed from the water
- **Sedimentation** - the water settles for about six hours and gravity causes suspended solids to drop to the bottom of the sedimentation basins where they are removed

- **Filtration** - the water is filtered through various materials, such as sand and gravel, removing smaller particles
- **Disinfection** - chemicals are added to the filtered water to kill any remaining parasites, bacteria, and viruses.

Exhibit 4: Raw Water from the Chattahoochee is Treated Through a Four-Step Process



Source: Prepared by auditors using interviews with Department of Watershed Management staff and observations and drinking water treatment plants

Watershed Management maintains certified operators on duty at all times, consistent with state rules. The city’s water treatment plants operate year-round and have at least one certified operator on duty during operation. According to state Rule 391-3-5-.14(5), “A supplier having a surface water source must have a certified operator on duty at all times when the water plant is in operation.”

To become a certified operator, the state requires the operator to complete required coursework, pass a state exam, and acquire the necessary work experience for each appropriate level of certification. Watershed Management encourages staff at many levels to obtain operator certification. Certificates are displayed at the treatment plants.

Drinking water plants keep records of water quality, as required by state rules. Watershed Management maintains testing and monitoring records of both the system and manual information in accordance with state rules. State Rule 391-3-5.14(7) requires water suppliers to maintain daily operational records of the water treatment plants, including the amount of water treated daily, results of daily testing, disinfectant residuals, and tests performed. Multiple state rules require these records to be submitted to the EPD on a periodic basis. Watershed Management provided us with records it submitted to the EPD in accordance with this rule.

The water treatment plants use the SCADA system to continuously monitor the water quality, consistent with state Rule 391-3-5-.09(1)(q). Since 1993, the EPD has required public water systems with a surface water source to continually monitor residual disinfectant concentrations of the water entering the distribution system in 15-minute intervals.

Certified water treatment operators also test hourly samples to compare to SCADA data to ensure accuracy of information recorded in the system. The samples are real-time representations of the water at a specific date and time. The department records the metrics in the treatment database system; the system is a relational database where performance is measured. Managers and supervisors set the daily parameters, which are more stringent than required by the EPD. Plant operators monitor the parameters hourly to decide on the quantity of chemicals to add to the water, either increasing or decreasing the dosage of chemicals if the parameters are not within the regulated range.

Watershed Management is enhancing its Operations and Maintenance Plan. State Rule 391-3-5-.14(12) requires all drinking water systems to create a plan that details the various operations and maintenance procedures for the entire water system. According to the Office of Water Treatment and Reclamation, the existing standard operating procedures comply with the requirements of the Safe Drinking Water Act. The department is also developing a consolidated operations and maintenance plan.

The City's Water Quality Testing and Reporting Generally Meet EPD Standards

Watershed Management tests more routine water quality samples than is required by EPA rules. The EPD currently requires the city to test at least 240 samples per month based upon the population

served; the city collects and tests on average more than 265 monthly samples. Lab technicians collect water samples throughout the distribution system according to a written sampling site plan approved by the EPD.

Three of the last five annual Water Quality Reports identified levels that exceeded maximum contaminant levels for total trihalomethanes by .73 parts per billion (ppb) in 2013, by 2 ppb in 2014, and most recently in the fourth quarter of 2017 by 1 ppb. The EPD issued a violation to the city in March 2018 for the 2017 trihalomethane exceedance, but the city was back in compliance prior to receipt of it.

The city received one violation from the EPD for not submitting the 2014 Water Quality Report timely but has since complied with the annual July 1st reporting deadline.

Watershed Management collects and analyzes more water samples than required by the EPD. Our review of records of routine monthly total coliform testing from January through March 2018 found that the city collected more than the minimum of 240 samples (see Exhibit 5). We compared the results that were manually documented in the field and in the laboratory to the laboratory management system and what was reported to the EPD in the monthly report. All the results were properly recorded and reported as required by the EPD.

Exhibit 5: Department Collects More Samples Than Required

Date	Number of Samples Taken
January 2018	267
February 2018	269
March 2018	260

Source: Auditor's review of laboratory field sheets for first quarter of calendar year 2018

The Office of Watershed Protection's laboratory technicians physically collect water samples to test for total coliform from at least 260 sampling sites that they visit on a rotating basis throughout the month. The purpose of testing for total coliform within the public water system is to ensure minimal levels of fecal pathogens in the drinking water through control of total coliform bacteria, including *Escherichia coli*, more commonly known as *E. coli*.

The Office of Watershed Protection’s laboratory technicians physically collect water samples to test for total coliform from at least 260 sampling sites that they visit on a rotating basis throughout the month. The purpose of testing for total coliform within the public water system is to ensure minimal levels of fecal pathogens in the drinking water through control of total coliform bacteria, including Escherichia coli, more commonly known as E. coli. According to state Rule 391-3-5-.23, the city is required to collect total coliform samples that are representative of water throughout the distribution system. The minimum monitoring frequency for total coliforms for community water systems is based on the population served by the system. Based on the population served, Watershed Management is required to take 240 samples per month (see Exhibit 6).

Exhibit 6: EPA Requires At Least 240 Samples Per Month

Public Water System ROUTINE Monitoring Frequencies					
Population	Minimum Samples/ Month	Population	Minimum Samples/ Month	Population	Minimum Samples/ Month
25-1,000*	1	21,501-25,000	25	450,001-600,000	210
1,001-2,500	2	25,001-33,000	30	600,001-780,000	240
2,501-3,300	3	33,001-41,000	40	780,001-970,000	270
3,301-4,100	4	41,001-50,000	50	970,001-1,230,000	300
4,101-4,900	5	50,001-59,000	60	1,230,001-1,520,000	330
4,901-5,800	6	59,001-70,000	70	1,520,001-1,850,000	360
5,801-6,700	7	70,001-83,000	80	1,850,001-2,270,000	390
6,701-7,600	8	83,001-96,000	90	2,270,001-3,020,000	420
7,601-8,500	9	96,001-130,000	100	3,020,001-3,960,000	450
8,501-12,900	10	130,001-220,000	120	≥ 3,960,001	480
12,901-17,200	15	220,001-320,000	150		
17,201-21,500	20	320,001-450,000	180		

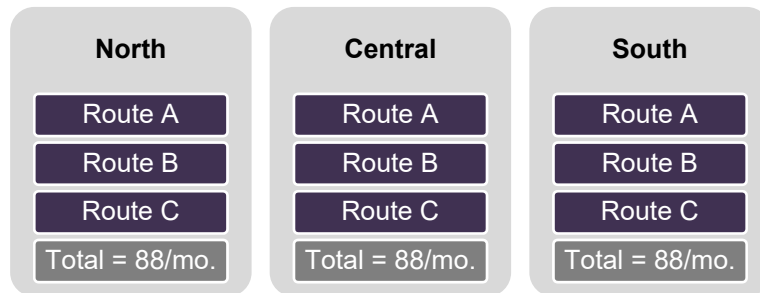
*Includes PWSs which have at least 15 service connections, but serve <25 people.

Source: EPA Total Coliform Rule: A Quick Reference Guide

Lab technicians collect water samples throughout the distribution system according to a written sampling site plan approved by the EPD. State Rule 391-3-5-.23 provides that the total coliform samples collected must be according to a written sample site plan. The city is required to submit a sampling site plan to Georgia EPD for approval. The EPD determines the number of required samples using the total number of active residential service connections multiplied by Georgia’s average population per household, as published in the most recent federal Census Bureau statistics.

The sampling plan divides the city into three large groups: North, Central and South (see Exhibit 7). Each group consists of three routes (Routes A, B and C) and 88 testing site locations. Certified laboratory technicians are assigned to a route on a rotating basis to collect total coliform samples from the public water system. The laboratory tests for chlorine, pH, temperature, total coliform, and E. coli presence within the sample. Coliform-positive testing sites are retested within 24 hours and additional samples are collected from a location upstream and downstream within five service connections to verify results.

Exhibit 7: Coliform Testing Occurs Based on Approved Sampling Plan



Source: Developed by auditors based upon interviews with the Office of Watershed Protection

The Office of Watershed Protection also conducts additional required testing throughout the distribution system in accordance with several state rules. To ensure that the drinking water is safe, maximum contaminant levels must be monitored through routine grab sample tests at the water treatment plants and the various sites throughout the distribution system. Each drinking water system has a unique testing and monitoring schedule depending on previous test results and its infrastructure. The EPD has assigned a routine sample and compliance schedule for the city (see Exhibit 2 on page 3).

The city is required to collect and submit these samples to the EPD in accordance to the sampling schedule. If not submitted or contaminants exceed the maximum levels, even after repeat testing, the EPD may issue a monitoring violation, which may result in a fine.

Watershed Management maintains a certified laboratory to test samples, consistent with state rules. The city tests samples at a laboratory located near the Chattahoochee water treatment plant; the EPD or third parties may test some samples as well. The Office of Watershed Protection manages one microbiological lab and one chemistry lab located at the testing facility. The microbiological lab

is certified by the EPD and is required to recertify every three years. The most recent recertification was May 2018 in accordance with state Rule 391-3-5-.14(11). The chemistry lab is not required to be certified. Both labs test water throughout the distribution system, including tests for dissolved oxygen, fluoride, hardness, and odor.

Watershed Management exceeded maximum contaminant levels during three of the last five years' water quality reports. The department reported that maximum contaminant levels exceeded for total trihalomethanes, which is a byproduct of drinking water chlorination, on the water quality reports from 2013, 2014, and 2017 (see Exhibit 8). Maximum contaminant levels are set by the EPD, as shown in Appendix B.

Exhibit 8: Maximum Contaminant Levels Exceeded During 2013 – 2014, 2017

Contaminant	MCL	2012	2013	2014	2015	2016	2017	Typical Source
Fluoride (ppm)	4	0.9	0.8	0.8	0.75	0.75	0.73	Water additive that promotes strong teeth
Nitrate as Nitrogen (ppm)	10	0.9	0.7	0.7	0.7	0.7	1.0	Runoff from fertilizer use
Chlorine (ppm)	4	1.4	1	1.4	1.48	1.39	1.39	Water additive used to control microbes
Haloacetic Acids (ppb)	60	31	52	47	39	45	54	By-product of drinking water chlorination
Total Coliform (% per sample)	5	1.1	1.1	1.8	1.1	3.1	1.1	Naturally present in the environment
Total Trihalomethanes (ppb)	80	32	80.73	82	67	70	81	By-product of drinking water chlorination
Copper (ppm)	AL=1.3	0.2	N/A	N/A	0.1	N/A	N/A	Corrosion of household plumbing systems
Lead (ppb)	AL=15	2.5	N/A	N/A	2.5	N/A	N/A	Corrosion of household plumbing systems

Notes:

- ppm = parts per million
- ppb = parts per billion
- AL=allowable limit

Source: Department of Watershed Management Annual Water Quality Reports from 2012-2017

Prior to receiving notification of the violation from the EPD, the city was back in compliance for total trihalomethanes, proven through subsequent testing. As of March 2018, the city has returned to compliance for this violation. According to the National Institute of Health, elevated levels of trihalomethanes have been associated

with negative health effects such as cancer and adverse reproductive outcomes.

The city also received a violation in July 2015 because watershed management missed the deadline to release the 2014 Water Quality Report to the EDP; the report was submitted in October 2015. The Department of Watershed Management is responsible for producing the reports annually to comply with state Rule 391-3-5-.41. According to the department, water customers did receive their notification on time. The reports are created to inform the customers and the public of water testing results, maximum contaminant levels for each parameter sampled, and characterize the risks, if any, of exposure to contaminants detected in the drinking water in an accurate and understandable manner.

Businesses voluntarily agree to allow the city to test their water as a condition of being a designated sampling site location. Because becoming a designated sampling site is strictly voluntary, it requires approval via a form and signature of a representative of the entity. In any given month, a site location could change management, go out of business, or could opt out of being a sampling site. In these cases, the Office of Watershed Protection must ask a neighboring business to volunteer to replace the business to continue to maintain a representative sample of the public water system. The department also has additional testing sites throughout the distribution system, called sampling stations, where the voluntary program is not available.

Watershed Management Notifies Customers of Changes Regarding Water Quality

The EPD requires the Department of Watershed Management to issue public notifications in the form of a boil water advisory or boil water notice to inform users of possible contamination in the water. Unknown water quality or a drop in the pressure below 20 pounds per square inch (PSI) will cause a boil water advisory to be issued. The Department of Watershed Management should issue an immediate and comprehensive boil water advisory to protect the public as required by the EPD. The Department of Watershed Management consults with the EPD before a boil water advisory is issued and the EPD must approve the removal request by the city before it can be lifted.

The Department of Watershed Management issued one boil water advisory in February 2018 for Fairburn, Union City, and South Fulton because of low water pressure. In accordance with EPD guidance, the department issues a boil water advisory, as a precautionary measure, to users of public drinking water to disinfect water that they may ingest due to the unknown quality of the water when pressure drops and/or there is possible contamination to the distribution system. According to the EPD, public drinking water systems are responsible for protecting public health by providing safe drinking water and advising affected customers to take precautionary measures when an interruption of water service occurs.

The Department of Watershed Management's standard operating procedures require an immediate and comprehensive boil water advisory to be issued in order to protect the public. A boil water advisory must remain in effect for a minimum of 24 hours. Residents must boil water before drinking or cooking, but the advisory does not affect the customer's ability to bathe or wash hands.

The city cannot lift a boil water advisory until the removal request is approved by the EPD. The department must test and submit a copy of laboratory results after the problem is fixed to ensure water quality is restored before the EPD can lift the advisory. According to the EPD, this includes the following tasks:

- distribution system integrity must be restored by repairing and/or isolating all main breaks
- pipes should be flushed until the water is clear
- adequate water should be pumped into the distribution system to pressurize all areas and build adequate reserve in the storage tanks
- free chlorine residual measurements and coliform bacteria samples must be collected from enough sites to adequately represent all areas of the distribution system
- free chlorine residuals must be detected throughout the distribution system and all microbiological tests (performed by a certified laboratory) must be negative for total coliform bacteria

The department does not automatically initiate a boil water advisory in the cases of a main break, water outage, or pipe disturbance, but one is required if the measured pressure drops below 20 PSI in a water pipe. Watershed Management's service monitoring team continuously monitors the distribution system using the SCADA

system. The system alerts the team when large pipes, 12 inches or above, break or are disturbed. Because the city's distribution system is large, smaller pipes do not generate a signal on the system when an issue occurs. The department relies upon customers to report smaller water main or pipe breaks.

City Met SLA for Water Quality Complaints but Reported Metrics Should Track Resolution

Watershed Protection staff contacted customers within the 36-hour service level agreement period for 87% of water quality complaints received between July 2017 and March 2018. We could not assess compliance for 6% of the complaints because information entered into the service order management system was either incorrect or missing. Although the department tracks the time it takes to make initial contact with the customer, it does not track and monitor the amount of time to resolve a complaint. We recommend that the Department of Watershed Management develop a performance target for resolving customer complaints and monitor compliance with the target. We also recommend that the department ensure that correct information is entered into the service order management system to accurately track compliance with service level agreements.

City Met Service Level Agreements for Water Quality Complaints

The Department of Watershed Management responded to most customer water quality complaints within the 36-hour service level agreement. Of 752 water quality complaints received by customers from July 2017 through March 2018, the Office of Watershed Protection responded to 87% within the 36-hour service level agreement (SLA). The SLA measures the time from the customer call to Watershed Management's initial contact with the customer (see Exhibit 9).

The department failed to contact customers within 36 hours for 7% of the complaints. We were unable to assess compliance with the performance target for 6% of the complaints because the customer contact date was blank in 18 of the records and 26 records contained a contact date that was prior to the customer call date.

Exhibit 9: City Met Service Level Agreements 87% of the Time

Did DWM Contact Customer within 36 Hours of Complaint?	Number of Work Orders	Total %
Met SLA	653	87%
Did Not Meet SLA	55	7%
Could Not Assess	44	6%
Total	752	100%

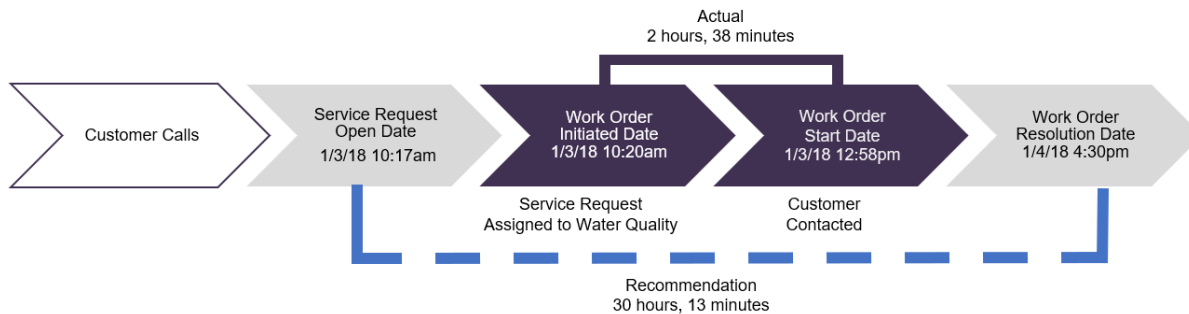
Source: Analysis of Water Quality Control Complaints from ATL311 from July 2017 through March 2018

Watershed Management received an average of 84 complaints per month during the period, with the highest number of calls received during September 2017, which coincided with significant inclement weather.

Although the department tracks and reports the time for responding to customer complaints by measuring the time to contact the customer, it does not track how long it takes to resolve the complaint and close the work order (see Exhibit 10). Data fields already exist within the reporting system to track resolution.

Customers report water quality issues to ATL311 or directly to the Office of Watershed Protection. The information received from the customer is documented in the service order management system by the ATL311 representative taking the call, and the service request is assigned to the water quality team in watershed protection.

Exhibit 10: City Only Measures Initial Customer Contact for Complaints



Source: Auditor analysis of water quality complaint from ATL311

A water quality specialist from the Office of Watershed Protection contacts the customer directly to troubleshoot the issue by asking

questions specifically about the taste, smell, or color of the water (see Exhibit 11). If water quality specialists are unable to resolve the issue over the phone, they will schedule a date and time with the customer to visit to the customer’s residence and flush the nearest fire hydrant. If necessary, the water quality specialist will collect a water sample from the customer’s tap and provide it to a certified lab technician in the microbiological laboratory to test.

Exhibit 11: Symptoms Determine Department’s Approach to Complaints

Nature of Call	Symptoms	Possible Cause	Actions
Air in Lines	- Milky, white, or foamy - Sputtering water lines	- Disruption of service	- Flush - Consult customer
Discoloration	- Reddish brown	- Dramatic change in system pressure - Reversal of flow	- Flush - Investigate - Deliver rust remover
	- Greenish blue	- Electrolysis	- Flush - Consult customer
Request Analysis	- News reports - Conversations with neighbors	- Concerns about water quality	- Flush - Sample - Investigate
Taste and Odor	- Water smells like: ❖ Rotten eggs ❖ Earthy ❖ Metallic ❖ Chlorine	- Low water circulation - Backflow condition	- Flush - Sample

Source: Developed by auditors with information from the Department of Watershed Management

According to staff, laboratory tests are conducted within 24 hours and the results are relayed to the customer. Once the problem is resolved, the water quality specialist will enter the results in the service order system and close the work order.

To ensure water quality complaints are resolved timely for customers, we recommend that the Department of Watershed Management develop a performance target for resolving customer complaints and monitor compliance with the target. The department should also ensure that correct information is entered into the service order management system to accurately track compliance with service level agreements.

Recommendations

To ensure timely and accurate resolution of water quality complaints for customers, the Commissioner of the Department of Watershed Management should:

1. create a service level agreement to measure the water quality complaint resolution, tracking the time that it takes to resolve the complaint from the date of the customer call.
2. ensure that work order dates are correctly entered into the service order management system to be able to accurately track performance.

Appendix

Appendix A: Management Review and Response to Audit Recommendations

Report # 18.04	Performance Audit: Water Quality Testing	Date: October 2018
<p>Recommendation 1:</p> <p>The Commissioner of the Department of Watershed Management should create a service level agreement to measure the water quality complaint resolution, tracking the time that it takes to resolve the complaint from the date of the customer call.</p>		
<p>Proposed Action: Create a SLA of a certain number of business days to resolve water quality complaints. We will adjust so that for the associated service request, the start date will be when the call is received, and the end date will be when the issue is resolved and service request is closed. We will review our history of activity as well as any other relevant information to ensure that the SLA is reasonable.</p>	<p>Response: Agree</p>	
<p>Person Responsible: Thomas Bourne</p>	<p>Implementation Date: December 2018</p>	
<p>Recommendation 2:</p> <p>The Commissioner of the Department of Watershed Management should ensure that work order dates are correctly entered into the service order management system to be able to accurately track performance.</p>		
<p>Proposed Action: Perform weekly audits of DWQC work orders to ensure accurate and complete data entry.</p>	<p>Response: Agree</p>	
<p>Person Responsible: Thomas Bourne</p>	<p>Implementation Date: October 2018</p>	

Appendix B: Management Response Memorandum



Keisha Lance Bottoms
MAYOR

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT
72 Marietta Street, N.W.
ATLANTA, GEORGIA 30303

Kishia L. Powell
COMMISSIONER

MEMORANDUM

To: Amanda Noble, City Auditor

From: Kishia L. Powell, Department of Watershed Management Commissioner

Date: September 14, 2018

Re: Water Quality Audit Response

We appreciate the efforts and assistance of the City Auditor's Office.

Our Department's goal is to continue providing our customers with excellent water quality and customer service. In pursuit of this goal, we will strive to provide timely response to customers' concerns regarding water quality. In doing so, we expect to maintain customers' confidence in the quality of the water and customer service provided to more than one million customers each day.

Our Department is in agreement with the recommendations regarding our work management and will develop the framework to determine and implement an appropriate service level agreement. Doing so, we expect to maintain customers' confidence in the quality of the water provided and our response to customer requests and needs.