SAGE MANAGEMENT CONSULTANTS, LLC

MANAGEMENT AND AFFILIATE AUDITS

OF

AQUA NEW JERSEY, INC.

FOR THE

STATE OF NEW JERSEY
BOARD OF PUBLIC UTILITIES

FINAL REPORT

June 12, 2018

SAGE
Management Consultants, LLC

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I. EXECUTIVE SUMMARY

A. INTRODUCTION AND OVERVIEW

This is the final report of the SAGE Management Consultants, LLC (SAGE) Management and Affiliate Transactions Audits of Aqua New Jersey, Inc. (Aqua NJ) for the New Jersey Board of Public Utilities (NJBPU). Aqua NJ is a wholly owned subsidiary of Aqua America, Inc. (Aqua America)

SCOPE OF WORK

The NJBPU has a highly developed Scope of Work for management and affiliate transaction audits specified in its Request for Proposals (RFP). It requires a comprehensive review of all major functional areas of Aqua NJ's operations and its transactions with its affiliates. SAGE analyzed the Scope of Work and placed each element into one of six Task Areas. The Task Areas correspond to chapters in this report and are:

- Executive Management
- System Operations
- Customer Service
- Human Resources
- Finance and Accounting
- Affiliate Relationships and Transactions

Support services are included in the Task Area with which they are most closely aligned, such as Legal with Executive Management and Materials Management with System Operations. This allows the simultaneous evaluation of the support service itself and its value to its internal clients.

The table below delineates the distribution of the NJBPU Scope of Work elements among the SAGE Task Areas. Each Task Area indicates the RFP scope elements included and the RFP number. All of the RFP scope elements are included in one or more Task Areas.

Aqua NJ Audit Scope and Task Area Reconciliation

Task Area	Included RFP Scope Elements (RFP Number)
Affiliate Relationships and Transactions	▪ Affiliate Relationships (3.1.e, 3.1.g, 3.1.i, and 3.2.b) ▪ Affiliate Cost Accounting and Allocations (3.1.b.a, 3.9.g, 3.11.a, 3.11.b, 3.11.c, and 3.11.f,) ▪ Competitive and Non-Competitive Bidding Procedures, Purchasing Independence, Purchasing Internal Controls, and Arms-Length Negotiations (3.11.d, 3.11.2, and 3.11.h.3) ▪ Affiliate Contracts and Leases (3.2.c, 3.11.e, and 3.11.h.1) ▪ Income and Other Tax Allocations (3.9.h and 3.9.i) ▪ Affiliate Transactions (3.1.k) ▪ Corporate Accounting and Cost Allocation Manuals (3.10.e) ▪ Cash Management and the Use of Aqua NJ Cash (3.9.1.a and 3.9.1b) ▪ Write-offs of Affiliates (3.9.1c) ▪ Capital and Resource Allocation to Aqua NJ versus Affiliates (3.1.f, 3.1.m, and 3.2.a) ▪ Compliance with Legal, Regulatory, and Contractual Requirements (3.2.e) ▪ Information Technology and Information Security (3.2.f) ▪ Ring Fencing and the Effect of Affiliates on Aqua NJ's Credit Worthiness and Cost of Capital (3.9.a, 3.9.b, and 3.9.c)
Executive Management	▪ Executive Management (3.1.d) ▪ Focus of Aqua NJ Management (3.4.e) ▪ Corporate Governance ▪ Corporate Structure, Separation, and Conflicts (3.1.a, 3.1.g, 3.11.g ▪ Boards of Directors and Governance (3.1.b and 3.1.i) ▪ Legal (3.9.b) ▪ Lawsuits Against the Board and Officers (3.1.l) ▪ Strategic Planning Process and Plans (3.4.d) ▪ Mission, Goals, and Objectives (3.4.a) ▪ Alignment of Aqua NJ and Affiliate Goals (3.3.c) ▪ External Relations (3.7)

Task Area	Included RFP Scope Elements (RFP Number)
Finance and Accounting	▪ Corporate Finance and Cost Control (3.9.a) ▪ Cash Management (3.9.a) ▪ Cost of Capital Comparison (3.9.c) ▪ Accounting Compliance with GAAP (3.9.d) ▪ Accounting Responsibilities and Accountabilities (3.10.a) ▪ Accounts Receivable (3.10.b) ▪ Payroll and Time Keeping (3.10.c) ▪ Budget Reporting (3.10.d) ▪ Work Order Procedures (3.10.d) ▪ Property Accounting and Records (3.10.e) ▪ Tax (3.9.h) ▪ Internal Controls (3.2.d) ▪ Sarbanes-Oxley Act Compliance (3.1.j) ▪ Independent External Audits (3.1.h) ▪ Internal Audits (3.9.f) ▪ Rate Case Frequency (3.4.b) ▪ Rate Structure and Design (3.9.e) ▪ NJ Class A Residential Rate and Cost Comparisons (3.4.b) ▪ Water System Acquisition Prices (3.1.n) ▪ Information Technology (3.8.g) ▪ Records Management (3.9.h)
Human Resources	▪ Executive Compensation and Comparison (3.1.c) ▪ Compensation and Benefits (3.3.a) ▪ Training and Development (3.3.b) ▪ Employee Performance Planning and Management (3.3.b) ▪ Labor Relations (3.3.c) ▪ Human Resources Information Availability and Accessibility (3.3.e) ▪ Affirmative Action and Equal Employment Opportunity (3.3.f) ▪ Risk Management, Insurance, and Claims (3.9.a)
System Operations	▪ Planning and Engineering (3.5.a, 3.5.b, and 3.5.h) ▪ Construction Management and Construction Project Performance (3.5.c) ▪ Operations and Maintenance (3.5.d) ▪ System Reliability and Compliance (3.5.e) ▪ System Line Loss (3.5.f) ▪ System Security (3.5.g) ▪ Security Department (3.8.i) ▪ Safe Drinking Water Act and NJ Statutory Act Compliance (3.5.e) ▪ Facilities Management (3.9.c) ▪ Land Management and Real Estate (3.9.d) ▪ Materials Management (3.9.e) ▪ Transportation Management (3.9.f) ▪ System Operations Employee Productivity and Utilization (3.3.d) ▪ Company Contractor Performance (3.12)

Task Area	Included RFP Scope Elements (RFP Number)
Customer Service	▪ Meter Reading (3.6.a) ▪ Billing (3.6.b) ▪ Credit and Collection (3.6.b) ▪ Complaints and Inquiries (3.6.b) ▪ Revenue Protection (3.6.b) ▪ Marketing (3.6.b) ▪ Conservation Efforts and Comparison (3.5.i) ▪ Customer Service Employee Productivity and Utilization (3.3.d)

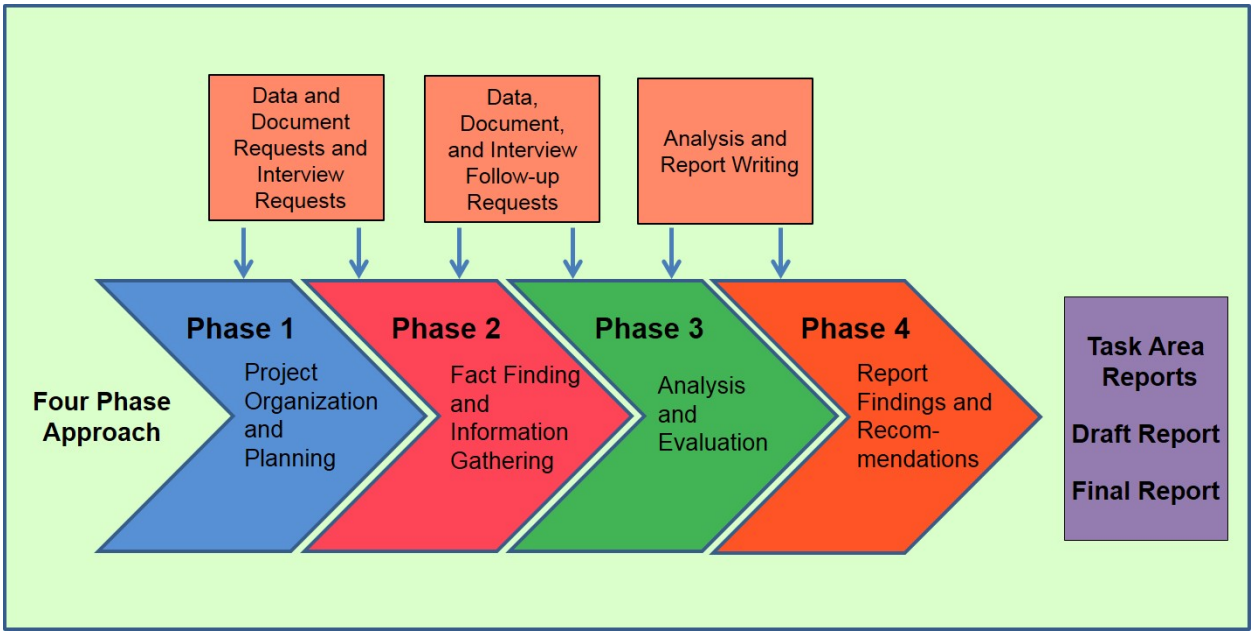
APPROACH

SAGE utilized a well-developed Four Phase Approach that has been proven on numerous regulatory affiliate and management audits and reviews. It was applied to the affiliate transaction audit and the management audit simultaneously for maximum efficiency. The SAGE approach consists of the following phases.

1. Project Organization and Planning
2. Fact Finding and Information Gathering
3. Analysis and Evaluation
4. Report Findings and Recommendations

This is illustrated in the following exhibit.

SAGE Four Phase Approach



SAGE METHODOLOGIES

SAGE utilized our proprietary Affiliate Relationships and Transactions audit methodology to guide the Affiliate Transactions Audit and our proprietary Planning, Process, and Performance Management audit methodology to guide the Comprehensive Management Audit. The SAGE Methodologies provide example good

practice evaluative criteria and the initial document requests for each audit element. Each Task Area follows the appropriate methodology using the same four phases of the SAGE approach. Further, the specific tasks and activities are the same for each Task Area. Each Task Area Lead Consultant, in conjunction with the Project Manager, issued document requests; conducted interviews and site visits; analyzed the information collected; performed special studies; formed findings and recommendations; and wrote Task Reports detailing the background, findings, and recommendations for each Task Area.

DOCUMENTS REVIEWED

In the course of the Management and Affiliate Audits, the SAGE team requested and analyzed 584 documents covering all aspects of the Scope of Work.

INTERVIEWS

The SAGE team conducted 102 interviews and site visits during the course of the Management and Affiliate Audits. All senior management personnel were interviewed and the SAGE team visited the Aqua NJ headquarters and all three Division work centers and the Aqua America headquarters in Bryn Mawr, Pennsylvania.

ORGANIZATION OF THE REPORT

This report is organized into individual chapters for each Task Area following this Executive Summary:

II. Executive Management
III. System Operations
IV. Customer Service
V. Human Resources
VI. Finance and Accounting
VII. Affiliate Relationships and Transactions

B. SUMMARY OF FINDINGS AND RECOMMENDATIONS

Following is a summary of all of the 120 findings and 66 recommendations in this report organized by chapter and section along with the page number on which the complete recommendation may be found.

Summary of Findings and Recommendations

Chapter/Section	Findings	Recommendations	Rec. Pg. No.
CHAPTER II. Executive Management			
Section IIB. Aqua America Board of Directors	1. With the exception of the current and former CEOs, the Board lacks significant, recent experience with water and wastewater utilities.	1. Aqua America should consider recruiting directors with water and wastewater utility experience. (See Finding 1)	35
	2. With the exception of the director who retired at the end of 2017, the Board of Directors lacks experience with enterprises employing a growth-by-multiple-small-acquisitions strategy.	2. Aqua America should consider recruiting directors with experience with enterprises employing a growth-by-multiple-small-acquisitions strategy. (See Finding 2)	36
	3. The scope of the Board's Risk Mitigation and Investment Policy Committee may be too broad.	3. Consider reassigning the responsibilities for risk evaluation and mitigation oversight to the Board Audit Committee. (See Finding 3)	36
	4. The Board's Governance Committee is charged with overseeing executive succession planning but there is no formal succession plan.	4. Have the Governance Committee require a formal executive succession plan from Aqua America and review it at least semi-annually. (See Finding 4)	36
Section IIC. Corporate Governance	1. The hybrid centralized and decentralized governance structure is effective for Aqua NJ.		

Chapter/Section	Findings	Recommendations	Rec. Pg. No.
Section IIC. Corporate Governance	2. The formal mission, vision, and core values of Aqua NJ and Aqua America are the same.		
	3. Aqua NJ and Aqua America do not keep and circulate minutes of the management committee meetings and Opportunity Meetings.	1. Keep and circulate minutes for the management committee meetings and the Aqua NJ Opportunities Meetings. (See Finding 3)	45
	4. The Aqua America corporate structure provides adequate separation between Aqua NJ regulated operations and the Aqua America unregulated operations and there are no apparent conflicts of interest.		
	5. The important functions of Customer Operations and Information Technology are relegated to the fourth level in the Aqua America organization structure.	2. Consider placing Customer Operations and Information Technology higher in the organization structure. (See Finding 5)	45
	6. Aqua America relies heavily on contractors but there is no centralized services contracting support.	3. Develop a services contracting function in the Supply Chain organization. (See Finding 6)	45
Section IID. Strategic Planning Process and Plans	1. There is no strategic planning process and there is no strategic plan.	1. Develop a strategic planning process that informs the subordinate functional plans. (See Finding 1)	50

Chapter/Section	Findings	Recommendations	Rec. Pg. No.
Section IID. Strategic Planning Process and Plans	2. New Jersey laws both encourage and discourage the acquisition of additional New Jersey water and wastewater systems by Aqua NJ or others.		
Section IIE. Corporate Performance Management	1. The Aqua NJ Scorecard is a good start but needs further development.	1. Upgrade the Aqua NJ Scorecard. (See Finding 1)	53
	2. Corporate performance management is the incentive compensation program at Aqua America in which 60% is focused on earnings per share, 15% is based on safety, 15% on water and wastewater regulatory compliance, and 10% is related to individual goals.	2. Consider developing a separate corporate performance management program and reweight the Aqua America incentive compensation program to less financial performance measures and more operational performance measures relevant to Aqua NJ. (See Finding 2)	54
	3. There is no Aqua America or Aqua NJ benchmarking program.	3. Develop a comprehensive benchmarking program. (See Finding 3)	54
Section IIF. Legal Department	1. The General Counsel's office does not include the regulatory counsels.	1. Consider reassigning the regulatory counsels to the General Counsel's office. (See Finding 1)	57
	2. The Assistant General Counsel assigned to Aqua NJ does not have a full scope of legal responsibility and is not an integral member of the Aqua NJ management team.	2. Increase the scope of the attorney assigned to Aqua NJ to cover all legal and risk related matters. (See Finding 2)	57

Chapter/Section	Findings	Recommendations	Rec. Pg. No.
Section II-G. Enterprise Risk Management	1. Aqua America is a long-established large company and its Enterprise Risk Management program development is late in being developed.	1. Hire or develop an ERM professional to direct the program. (See Findings 1 and 2)	62
	2. The ongoing operation of the ERM program development and operation is under-resourced.		
	3. The risks disclosed in the Aqua America SEC Form 10-K are not entirely consistent with the risks identified in the development of the ERM program.	2. Reconcile the ERM developed risks and the risks disclosed in the SEC Form 10-K. (See Finding 3)	63
CHAPTER III. System Operations			
Section III-A. Overview	1. Six of Aqua NJ's wastewater systems do not have SCADA monitoring.	1. Aqua NJ should install SCADA monitoring systems on its wastewater facilities that do not have them. (See Finding 1)	69
Section III-C. Aqua Services Regulated Operations	1. The support services provided to Aqua NJ by Aqua Services are effective.		
	2. Presently, the two Engineering Technicians on the Aqua NJ staff report to the Operations Director; however, the State Engineer is more directly involved in the engineering matters of Aqua NJ than the Operations Director.	1. Consider realigning the reporting arrangement for the two Aqua NJ Engineering Technicians to report directly to the State Engineer instead of the Operations Director. (See Finding 2)	79

Chapter/Section	Findings	Recommendations	Rec. Pg. No.
Section III-D. Performance	1. Aqua NJ's performance in Operations Management on the 2017 Scorecard has been strong, bettering most of the 2017 targets as well as the AWWA benchmark medians.		
	2. Aqua NJ's performance in Environmental Compliance on the 2017 Scorecard has been strong, bettering most of the 2017 targets as well as the AWWA benchmark medians.		
	3. Aqua NJ presently has no notices of violation or fines and complies with NJDEP sampling requirements.		
	4. Aqua NJ has controlled its O&M costs well over the past five years.		
	5. Aqua NJ has taken effective measures in all Divisions to identify and reduce non-revenue water and is below the average of other New Jersey water utilities.		
	6. Aqua NJ workforce productivity improved substantially during the 2013 to 2016 timeframe.		

Chapter/Section	Findings	Recommendations	Rec. Pg. No.
Section III-D. Performance	7. The revamping of the Scorecard for Aqua NJ has introduced some improvements but some aspects of the new Scorecard detract from its usefulness.	1. Further upgrade the Aqua NJ Scorecard by entering actual performance data for all metrics that are included on the Scorecard and assigning targets for all metrics being tracked. (See Finding 7)	96
	8. Aqua NJ safety performance has been inconsistent.	2. Aqua NJ should ensure that its Safety performance is completely and accurately registered on the Scorecard. (See Finding 8)	96
Section III-E. Practices and Processes	1. Aqua NJ Operators and Field Service Workers, with few exceptions, begin each work day by reporting to Division offices before proceeding to assigned work locations.	1. Aqua NJ should consider home dispatch for Operators and Field Service Workers. (See Finding 1)	105
	2. A business intelligence tool is used to monitor and analyze the average time required to complete maintenance tasks by task and by individual worker.		
	3. Field tablet devices for Aqua NJ FSWs do not yet have the capability to access GIS.	2. Consider adding the capability to access the Aqua NJ GIS to the FSW tablet devices. (See Finding 3)	105

Chapter/Section	Findings	Recommendations	Rec. Pg. No.
Section III-E. Practices and Processes	4. Although outside meter installation is the preferred location for maintenance convenience and to avoid entering the customer premises, 90% of Aqua NJ's water meters are inside.	3. Perform a cost-benefit analysis to determine the cost effectiveness of moving meters from inside customer premises to outside meter pits. (See Finding 4)	105
	5. Although Aqua NJ performs evaluations of contractor performance following projects, there is no indication that the results of these evaluations are memorialized for reference during future contract bid evaluations.	4. Formalize the contractor performance evaluation process and record the results for reference during future contract bid evaluations. (See Finding 5)	105
Section III-F. System Planning, Facilities, and Land Management	1. The system planning process for Aqua NJ effectively identifies water and wastewater system capital program needs.		
	2. Aqua NJ does not have a facilities management plan or strategy.	1. Aqua NJ should develop a facilities management plan and a land/real estate management plan to optimize the value of its facilities and real estate holdings. (See Findings 2 and 3)	107
	3. Aqua NJ does not have a land/real estate management plan or strategy.		
Section III-G. Capital Program	1. Aqua NJ effectively manages its capital investment program.		

Chapter/Section	Findings	Recommendations	Rec. Pg. No.
Section III-G Capital Program	2. Aqua NJ Divisions track and record main leaks using different methods.	1. Aqua NJ should standardize the methodology for tracking and recording main leaks to enhance the input of information for main replacement prioritization. (See Finding 2)	112
Section III-H. System Acquisitions	1. From a financial and accounting perspective, the methodology and basis for Aqua NJ's recent system acquisitions are considered reasonable (see Chapter VI, Finance and Accounting); however, from an operating perspective, the acquisitions completed from 2012 to present have been impractical and the operation and maintenance of the acquired systems is inefficient.	1. Aqua Services should consider inclusion of an accessibility factor in its due diligence evaluation checklist for the maintenance and operation of candidate acquisitions. (See Finding 1)	114
Section III-I. Procurement, Materials Management, and Transportation	1. Since 2013, Procurement has initiated several improvements in purchasing practices and strategies.		
	2. Insufficient checks and balances exist in engineering, construction, and emergency services contracting.	1. Aqua Services should review and strengthen its engineering and construction contracting process to include more checks and balances to avert any potential malfeasance. (See Finding 2)	120

Chapter/Section	Findings	Recommendations	Rec. Pg. No.
Section III-I. Procurement, Materials Management, and Transportation	3. Aqua NJ management has established a set of practical, no-nonsense policies for general company vehicle operation, maintenance, and use.		
Section III-J. Operational Security	1. Aqua NJ's security performance has been strong with no reportable events during the 2012 to 2017 timeframe.		
	2. Aqua NJ has taken effective measures to meet NJBPU's new cybersecurity requirements.		
CHAPTER IV. Customer Service			
Section IVB. Metering and Meter Reading	1. Aqua NJ meter reading performance has been generally good, either exceeding or at least meeting its targets.		
	2. Several of the Aqua NJ metering metrics have no performance measurement value.	1. Remove or replace irrelevant or inadequate metrics from Aqua NJ monthly performance reporting and add more relevant metrics. (See Finding 2)	130
	3. Aqua Services Supply Chain Management has a comprehensive, well-defined, and well-documented process for purchasing meters.		
Section IV-C. Billing and Payments	1. Aqua NJ customer electronic bills are increasing and printed bills are decreasing, driving down processing costs.		

Chapter/Section	Findings	Recommendations	Rec. Pg. No.
Section IV-C. Billing and Payments	2. Aqua NJ bill payments transacted online have increased in 2016 over 2015, driving down processing costs.		
	3. ACO can improve the customer experience and reduce costs by moving the Zipcheck enrollment process online.	1. Move forward with the development of moving Zipcheck enrollment on line. (See Finding 3)	134
Section IV-D. Credit and Collections	1. Aqua NJ has generally performed better than its targets, but performance trends have not improved significantly for two Credit and Collections metrics.		
	2. ACO lacks a number of collections agency metrics and lacks adequate reporting formats that would support performance improvement.	1. Implement additional ACO Credit and Collection metrics for better performance management. (See Finding 2)	137
Section IV-E. Call Center Operations	1. Annual Call Center CSR Quality Call Evaluation scores declined by seven percent through 2016 and have been below the target.	1. Analyze the decline in annual average Quality Assurance CSR Call Evaluation scores and the below-target performance for the call centers and implement corrective actions. (See Finding 1)	147
	2. The Quality Assurance CSR Call Evaluation Program is inadequate.	2. Correct the problems of the Quality Assurance CSR Call Evaluation Program. (See Finding 2)	147
	3. The ACO Call Center ratio of calls per Customer Service Representative has improved since 2015.		

Chapter/Section	Findings	Recommendations	Rec. Pg. No.
Section IV-E. Call Center Operations	4. ACO does not maintain multi-year call center staffing, activity, service levels, and unit cost data that would enable performance trending and analysis.	3. Improve call center productivity and utilization in conjunction with customer service quality. (See Finding 4)	147
	5. ACO measures individual CSR performance well.		
	6. ACO is beginning to take appropriate steps to improve call center customer service performance management.		
	7. The ACO call centers do not have First Call Resolution as a key objective and performance metric.	4. Implement First Call Resolution as a key performance objective and metric. (See Finding 7)	148
	8. Aqua Services does not have Aqua NJ-specific results from the J.D. Power Annual Customer Satisfaction Surveys.	5. Explore the ability to include Aqua NJ as a stand-alone participant in the J.D. Power Annual Customer Satisfaction Surveys. (See Finding 8)	148
	9. ACO used J.D. Power to assess the ACO call center CSR training program but has not followed through on potential improvement opportunities.	6. Implement the J.D. Power recommendations for improved CSR training. (See Finding 9)	149
	10. ACO did not implement suggested customer service improvements made by its market research consultant in the 2015 Customer Satisfaction Study.	7. Implement the 2015 Customer Satisfaction Study recommendations for improved customer experience. (See Finding 10)	149

Chapter/Section	Findings	Recommendations	Rec. Pg. No.
Section IV-E. Call Center Operations	11. ACO lacks current and consistent call center customer service transactional surveys.	8. Perform periodic customer satisfaction transactional studies and other annual studies and surveys. (See Finding 11)	149
	12. ACO has an acceptable standardized process for CIS change management.		
	13. ACO and Aqua Services Information Technology lack a credible plan to analyze the maintain-or-replace decision for the CIS.	9. Develop a credible plan for improving and maintaining or replacing the CIS. (See Finding 13)	149
Section IV-F. Complaints	1. Aqua NJ customer complaints filed with the NJBPU have increased by 47% from 2013 through 2016.	1. Analyze the root causes for the increased NJBPU complaints and implement improvements that will more closely address customer problems. (See Finding 1)	152
	2. It is likely that Aqua NJ internal tracking of customer dispute types are not being accurately categorized and ACO is missing an opportunity to understand the types and trends of disputes and to identify opportunities to improve performance.	2. Develop a consistent approach for more accurately categorizing and tracking Aqua NJ disputes. (See Finding 2)	152
Section IV-G. Revenue Protection	1. Aqua NJ lacks theft of service metrics.	1. Develop and track theft-of-service metrics. (See Finding 1)	152

Chapter/Section	Findings	Recommendations	Rec. Pg. No.
Section IV-H. Communications	1. Marketing and Communications has a comprehensive "2017 Marketing & Communications Plan" that sets objectives and goals aimed at improving communications with customers, community representatives, and employees.		
	2. Marketing and Communications has appropriate plans to improve the online customer experience.	1. Implement the Customer Experience Website Project to improve the customer experience. (See Finding 2)	157
	3. Customer conservation, measured by decreasing gallons sold per residential customer, has improved since 2012.		
Section IV-I. Aqua Customer Operations Overall Performance Management	1. ACO began to improve workload tracking and performance reporting in 2017.	1. Establish a comprehensive set of ACO performance metrics. (See Findings 2 and 5; and Section B. Metering and Meter Reading Finding 2, Section D. Credit and Collections Finding 2, Section E. Call Center Operations Findings 4 and 7, and Section G. Revenue Protection Finding 1)	165

Chapter/Section	Findings	Recommendations	Rec. Pg. No.
Section IV-I. Aqua Customer Operations Overall Performance Management	2. ACO lacks a comprehensive approach to performance reporting.	2. Implement an ACO Monthly Performance Report as a basis for ACO performance management meetings that focuses on corrective actions and performance improvements. (See Finding 2)	167
	3. ACO lacks sufficient analytic and performance-oriented staff resources but is planning to add a second resource.	3. Develop and expand the capability for performance analytic skills within ACO to support performance analysis and management. (See Finding 3)	168
	4. The NJ State Opportunities meetings do not document ACO or Aqua NJ customer service performance issues and action items.	4. Restructure Aqua NJ State Opportunities meetings to focus on performance management, improvement, and follow-up actions. (See Finding 4)	168
	5. ACO does not use unit costs for performance management.	5. Implement improved cost performance management with unit costs. (See Finding 5)	169
	6. ACO lacks a benchmarking program to support performance management.	6. Make benchmarking a new objective and take advantage of existing national benchmarking resources. (See Finding 6)	170
	7. ACO lacks adequate contract management and vendor performance oversight.	7. Improve ACO contract management and vendor performance and renegotiate or rebid existing contracts including considering alternative vendors. (See Finding 7)	171

Chapter/Section	Findings	Recommendations	Rec. Pg. No.
Section IV-I. Aqua Customer Operations Overall Performance Management	8. The ACO business process documentation tool does not support process analysis, training, and job descriptions.	8. Implement an ACO business process improvement strategy with appropriate process documentation and management tools. (See Finding 8)	172
Section IV-J. Non-Revenue Water Panel	1. Aqua NJ non-revenue water has been decreasing and is below the average of other New Jersey water utilities.		
CHAPTER V: Human Resources			
Chapter V. Human Resources	1. Labor relations are positive between Aqua NJ and its union, the Service Employees International Union Local 32BJ, as evidenced by the limited number of labor issues, including grievances, work stoppages, and work rules disputes.		
	2. Aqua NJ workers compensation insurance claims since 2012 have been relatively low and claims costs have been reasonable.		
	3. The Aqua Services Human Resources Department has placed strong emphasis on its Affirmative Action and Equal Employment Opportunity (AAEEO) program.		

Chapter/Section	Findings	Recommendations	Rec. Pg. No.
Chapter V. Human Resources	4. Numerous staffing vacancies exist in key positions within the Aqua Services Human Resources Department and attrition in key positions has disrupted the continuity of the Department.	1. Aqua Services leadership should perform an objective review of the circumstances involved with the staffing turbulence in the Human Resources Department, identify the root cause(s) for it, and solve the problems. (See Finding 4)	200
	5. Aqua Services Human Resources lacks a proactive, comprehensive, and thoughtfully-designed training and development program.	2. Human Resources should design and implement a thoughtful, comprehensive training and development program. (See Finding 5)	200
	6. The Aqua Service's Annual Employee Performance Evaluation (Form B) process for non-union employees is poorly defined and lacks specific employee performance improvement planning.	3. Human Resources should enhance the Employee Performance Evaluation process to include development of collaborative employee performance improvement plans developed by each employee and the evaluating supervisor. (See Finding 6)	200
	7. Aqua Services Human Resources Department lacks expected policy, procedure, and process documentation needed to effectively manage its functions.	4. Human Resources should conduct a thorough and objective upgrade of its policy, procedure, and process documentation to address the obvious deficiencies that exist and to ensure the continuity of its human resources management capabilities as well as to sustain service levels. (See Finding 7)	200

Chapter/Section	Findings	Recommendations	Rec. Pg. No.
Chapter V. Human Resources	8. The Aqua Services organizational structure has more management levels (echelons) than desirable. 9. The spans of control for the Aqua Services organization structure are often well below the expected span of control range for a utility of its size and complexity.	5. Restructure the Aqua Services organization to enhance efficiencies by eliminating unnecessary echelons and increasing spans of control. (See Findings 8 and 9)	200
	10. The Executive Compensation Committee's annual benchmarking of the competitiveness of the Aqua America's executive compensation is flawed and makes comparisons that are not appropriate for water and wastewater industry executives.	6. The Executive Compensation Committee should make compensation comparisons with other water and wastewater companies when benchmarking the competitiveness of Aqua America NEO compensation. (See Finding 10)	201
	11. The actual 2016 cash incentive compensation for Named Executive Officers (NEOs) substantially exceeded the cash incentive compensation targets set by the Compensation Committee for all NEOs, ranging from 26.0% to 52.2% above the individual cash award targets.	7. To achieve actual cash incentive awards to NEOs that are aligned with the targets set by Executive Compensation Committee, the Committee should consider establishing performance objectives that are more challenging for NEOs. (See Finding 11)	201

Chapter/Section	Findings	Recommendations	Rec. Pg. No.
CHAPTER VI. Finance and Accounting			
Chapter VI. Finance and Accounting	1. The methodology and basis used to price acquisitions of small, non-governmental water and wastewater systems are reasonable.		
	2. Aqua NJ's operating expense ratio has declined over the last five years and does not seem to be affected by the acquisitions of small water and sewer systems.		
	3. Treasury functions are managed in an effective and cost-efficient manner.		
	4. Aqua NJ's rate structure and design model is typical to that of similar sized utilities and is constructed to provide accurate and verifiable rates for its ratepayers.		
	5. The external audit process is independent and effective in testing and evaluating internal controls based on assessed risk.		
	6. Accounting procedures comply with Generally Accepted Accounting Principles.		
	7. The budget process operates effectively.		

Chapter/Section	Findings	Recommendations	Rec. Pg. No.
Chapter VI. Finance and Accounting	8. The CIS is approaching end-of-life status and there are concerns that this system does not adequately support the Aqua NJ business needs.	1. Information Technology should evaluate the CIS to determine if it should be replaced. (See Finding 8)	237
	9. The Information Technology organization structure is designed to provide effective service to Aqua NJ users.		
	10. Information Technology does not use vendor performance files in arranging for contractors to work on systems and programming.		
	11. Records management is not centralized for the functions and departments providing support to Aqua NJ.	2. The Records Management function should be centralized and managed by a records management function. (see Finding 11)	237
	12. Aqua America, Inc. is in compliance with the New York Stock Exchange (NYSE) requirements and the Sarbanes-Oxley Act.		
	13. Internal auditing of Aqua NJ's operations has been effective in ensuring compliance with applicable accounting rules and regulations.		
	14. The Internal Audit Department is adequately staffed for the current work load.		

Chapter/Section	Findings	Recommendations	Rec. Pg. No.
Chapter VI. Finance and Accounting	15. The Internal Audit Department received a "Partially Conforms" rating on an external quality assessment but is working to correct the deficiencies identified.		
CHAPTER VII. Affiliate Relationships and Transactions			
Chapter VII. Affiliate Relationships and Transactions	1. Aqua Services and ACO expenses charged to Aqua NJ have been increasing at a faster rate than other Aqua NJ expenses.		
	2. Policies and procedures adequately document the Aqua NJ affiliate transaction process with Aqua Services.		
	3. There could be better transparency concerning the departments or type of costs that are collected in and allocated from the Accounting Units.	1. Improve the transparency of the Accounting Units and the applicable departments, functions, and cost centers by name, and document the allocation methodologies in the Corporate Charges Allocations Manual. (See Finding 3)	253
	4. Allocation percentages to entities attached to the Accounting Units appear to be arbitrary.	2. Reevaluate current allocation methodologies. (See Finding 4)	253
	5. Too much of Aqua Services' costs charged to Aqua NJ are allocated, rather than direct charged.	3. More affiliate cost from Aqua Services assigned to Aqua NJ should be directly charged rather than allocated. (See Finding 5)	253

Chapter/Section	Findings	Recommendations	Rec. Pg. No.
Chapter VII. Affiliate Relationships and Transactions	6. There is limited affiliate relationships and transactions training.	4. Affiliate relationship and transaction training should be formalized and increased. (See Finding 6)	254
	7. The basis for allocating Aqua Services executive compensation to Aqua NJ is the same as other costs allocated to Aqua NJ.		
	8. Controls over Aqua NJ's affiliate transactions are reasonable.		
	9. Aqua NJ's effective Federal income tax rate is much higher than Aqua America's effective Federal Income Tax rate.	5. Have an expert third party examine Aqua NJ's payments to Aqua America for income taxes to determine if they are equitable. (See Finding 9)	254
	10. The Aqua Resources service line warrantee product provided by HomeServe, an unaffiliated company, and sold to Aqua NJ customers is not reported as an affiliate relationship and transaction.	6. Report HomeServe product sales as Aqua NJ affiliate transactions. (See Finding 10)	254
	11. A review of Board of director meeting minutes did not reveal any discussions considered harmful to Aqua NJ's ratepayers.		

II. EXECUTIVE MANAGEMENT

This chapter addresses the Aqua New Jersey, Inc. (Aqua NJ) and Aqua America, Inc. (Aqua America) executive management functions in several sections:

A. Overview
B. Aqua America Board of Directors
C. Corporate Governance
D. Strategic Planning Process and Plans
E. Corporate Performance Management
F. Legal Department
G. Enterprise Risk Management
H. External Relations

A. OVERVIEW

AQUA NEW JERSEY, INC.

Aqua NJ is a wholly owned subsidiary of Aqua America, a publicly traded company on the New York Stock Exchange. It was acquired by Aqua America in 2003. Aqua NJ has been developed through the acquisition of 35 separate water and wastewater systems. Its origin is in the Peoples Water Company, which was incorporated in 1885. Other former company names were Blackwood Water Company, Hamilton Square Water Company, and Califon Water Company. It has been named Aqua NJ since 2004. Aqua NJ's corporate offices are located in Hamilton Township, Mercer County, New Jersey.

Aqua NJ provides water and wastewater service to 53,000 customers in 33 municipalities or other political subdivisions across New Jersey. It has 53 water treatment facilities with 52,000 water connections and six wastewater treatment facilities with 6,000 wastewater connections. Some customers have both water and wastewater connections. Aqua NJ also provides service to 25 public water systems. Its service territory is divided into four geographic divisions, North, Central, East, and South. Aqua NJ's water source is groundwater from 83 wells.

Aqua NJ is made up of 25 discreet water systems, all with water treatment plants operated by Aqua NJ, and ten discreet wastewater systems, six with treatment plants operated by Aqua NJ. The smallest and largest water systems have 17 and 15,372 connections, respectively. The smallest wastewater system has 86 connections and the largest has 2,572. The average system size (58,000 connections divided by 35 discreet systems) is 1,657 connections.

Aqua NJ Board of Directors

As is typical with state utility operating company subsidiaries of a holding company, the Aqua NJ Board of Directors is made up of the Aqua NJ President and several Aqua America officers:

- Chief Executive Officer

- Chief Financial Officer
- General Counsel and Secretary
- Chief Operating Officer
- Executive Vice President, Strategy and Corporate Development

The Aqua NJ Board of Directors fulfills the corporate legal requirements for Aqua NJ, such as annual meetings and reports. However, Aqua NJ is managed by Aqua America through the Aqua Services Company as described in the Corporate Governance section below.

Aqua NJ Corporate Officers

As is typical with state utility operating company subsidiaries of a holding company, the Aqua NJ officers are virtually the same as the Aqua America officers. The Aqua NJ President, the Aqua NJ Controller and Assistant Secretary, and several Aqua America officers are listed in the Aqua NJ 2016 Annual Report:

- Chief Executive Officer
- Chief Operating Officer
- General Counsel and Secretary
- Chief Financial Officer
- Executive Vice President, Strategy and Corporate Development
- Senior Vice President, Engineering
- Regional Controller

However, virtually all of the Aqua America officers are also Aqua NJ officers.

The Aqua NJ President and Controller and Assistant Secretary are located at the Aqua NJ headquarters in Hamilton Township, NJ. All of the Aqua America officers are located at the Aqua America headquarters in Bryn Mawr, Pennsylvania.

AQUA AMERICA, INC.

Aqua America is a Pennsylvania registered holding company created in 1968 and is the parent of Aqua NJ. It is comprised of ten operating segments, eight state regulated and two non-regulated. The eight regulated operating segments consist of water and wastewater utility companies organized by the states in which Aqua America provides services, such as Aqua NJ in New Jersey. On a consolidated level, these eight regulated utility segments provide water and wastewater services to approximately one million customers in eight states including Pennsylvania, Ohio, Texas, Illinois, North Carolina, New Jersey (Aqua NJ), Indiana, and Virginia.

The two Aqua America non-regulated business segments are Aqua Infrastructure, LLC and Aqua Resources, Inc. In 2016, Aqua America reported Aqua Resources and Aqua Infrastructure operating revenues of $20 million, $15 million less than 2015 due to divestitures of business units. Further, Aqua America reported operating revenues of $10 million for its contract operations that are integrated into, and reported with, its regulated operations, generally consistent with prior years. The total unregulated segments and contract operations revenues of $35 million are 4.3% of the total Aqua America consolidated operating revenue of $820 million in 2016.

Aqua America, which prior to its name change in 2004 was known as Philadelphia Suburban Corporation, was formed in 1968 as a holding company for its primary subsidiary, Aqua Pennsylvania, formerly known as Philadelphia Suburban Water Company. In the early 1990s, Aqua America embarked on a growth-through-acquisition strategy focused on water and wastewater operations. The most significant transactions to date have been the merger with Consumers Water Company in 1999; the acquisition of the regulated water and wastewater operations of AquaSource, Inc. in 2003; the acquisition of Heater Utilities, Inc. in 2004; and the acquisition of American Water Works Company, Inc.'s regulated water and wastewater operations in Ohio in 2012. Since the early 1990s, the business strategy has been primarily directed toward the regulated water and wastewater utility industry.

During the period 2010 through 2013, Aqua America sold utility operations in six states, pursuant to a portfolio rationalization strategy to focus operations in areas where the company had critical mass and economic growth potential. Currently, Aqua America seeks to acquire businesses in the U.S. regulated sector, which includes water and wastewater utilities and other regulated utilities, and to pursue growth ventures in market-based activities, such as infrastructure opportunities that are supplementary and complementary to the regulated businesses. Aqua America has 48 legal entity subsidiaries, all 100% owned.

AQUA SERVICES COMPANY

Most shared services among the regulated and unregulated subsidiaries of Aqua America are provided by Aqua Services. Inc. (Aqua Services). All of the senior Aqua America executive officers and many of their subordinates are employees of Aqua Services. Shared services include accounting and finance; legal; investor relations; corporate development; customer services; information technology; fleet management; materials supply chain; facilities; engineering; environmental; safety; human resources; and legislative, public, and regulatory affairs.

Essentially, Aqua NJ contracts with and pays Aqua Services for corporate governance, executive management, and shared services. Please see Chapter VII, Affiliate Relationships and Transactions, for more information on the relationship between Aqua NJ and Aqua Services.

AQUA INFRASTRUCTURE, LLC

Aqua America formed the subsidiary Aqua Infrastructure, LLC (Aqua Infrastructure) to pursue growth opportunities in the unregulated sector. Aqua Infrastructure specializes in the planning, permitting, construction, and management of fresh water pipelines. Its primary focuses are the shale industry, public private partnerships, and industrial water supply.

In September 2011, Aqua Infrastructure entered into a Joint Venture with a firm that operates natural gas pipelines and processing plants for the construction and operation of a private pipeline system to supply raw water to natural gas well drilling operations in the Marcellus Shale formation in north-central Pennsylvania. Aqua Infrastructure owns 49% of the Joint Venture. The initial 18-mile pipeline commenced operations in 2012. The initial pipeline system was expanded an additional 38 miles with a permitted intake

on the Susquehanna River (which does not supply Aqua NJ), which extended the pipeline to additional drillers. The Joint Venture has entered into water supply contracts with natural gas drilling companies. Aqua Infrastructure does not operate in New Jersey.

AQUA RESOURCES, INC.

Aqua Resources, Inc. (Aqua Resources) provides water and wastewater service through operating and maintenance contracts with municipal authorities and other parties in close proximity to Aqua America utility companies' service territories and offers, through a third party, water and wastewater line repair service and protection warrantees to households. During 2016, Aqua America completed the sale of business units within Aqua Resources which provided liquid waste hauling and disposal services, and inspection, cleaning, and repair of storm and sanitary wastewater lines. Further, the business units within Aqua Resources which installed and tested devices that prevent the contamination of potable water were sold in January 2017 along with a business unit that repaired and performed maintenance on water and wastewater systems.

Aqua Resources is also in the business of developing bulk water stations specifically and solely designed around the needs of the Marcellus Shale industry in northeastern and western Pennsylvania and Ohio. Aqua Resources does not operate in New Jersey, other than offering a third-party service line warrantee product to Aqua customers. Please see Chapter VII, Affiliate Relationships and Transactions, for more information on the third-party warrantee product.

AQUA PENNSYLVANIA, INC.

The largest Aqua NJ affiliate Aqua America operating subsidiary is Aqua Pennsylvania, Inc. (Aqua Pennsylvania), which accounted for approximately 52% of the operating revenues and approximately 74% of the net income of Aqua America for 2016. Aqua Pennsylvania's service territory is located in the suburban areas in counties north and west of the City of Philadelphia and in 27 other counties in Pennsylvania. Some of the Aqua Pennsylvania employees, such as the Regional Controller, Legal Department Manager, and Fleet Management personnel, provide shared services to Aqua NJ. The provision of services from Aqua Pennsylvania to Aqua NJ creates an affiliate relationship between the two companies.

B. AQUA AMERICA BOARD OF DIRECTORS

MEMBERSHIP

During the management audit field work, the Aqua America Board of Directors was composed of eight members, including the current and former Chief Executive Officers of Aqua America. The other six directors are not current or former employees of Aqua America. The directors are elected at the Annual Meeting for one year terms expiring at the next Annual Meeting. Directors who joined after 2015 may only serve 15 years. Directors must retire at the age of 75. The Board Members elected at the 2017 Annual meeting were:

- Nicholas DeBenedictis – Non-Executive Chairman of the Board and retired Chief Executive Officer of Aqua America
- Christopher H. Franklin – current Chief Executive Officer of Aqua America
- Carolyn J. Burke – Executive Vice President, Strategy for Dynegy, Inc., a commercial power generation company
- Richard H. Glanton – Lead Independent Director and Founder, Chairman, and Chief Executive Officer of ElectedFace, Inc., a social media website
- Lon R. Greenberg – Chairman Emeritus of the Board and Retired Chief Executive Officer of UGI Corporation, operator of electric and natural gas utilities, propane distributors, and related businesses
- William P. Hankowsky – Chairman, President, and Chief Executive Officer of Liberty Property Trust, a fully integrated real estate firm
- Wendell F. Holland – Partner, CFSD Group, LLC, advisors for local and regional utility financing
- Ellen T. Ruff – Partner, McGuire Woods, LLP, a law and consulting firm, and former President, Office of Nuclear Development of Duke Energy Corporation, an operator of electric and natural gas utilities and related businesses

The 2017 Board had two women members and two members of color.

In June, 2017, a new director was elected, Daniel J. Hilferty, President and Chief Executive Officer of Independence Health Group, a Philadelphia based health insurer.

In December, 2017, Mr. Greenberg announced his retirement from the Board, Mr. DeBenedictis became Chair Emeritus while still serving as a Board Member, Mr. Franklin, the Aqua America CEO, became Chair of the Board, and Mr. Hilferty replaced Mr. Glanton as the Lead Independent Director.

A new national search has been initiated for a ninth director to fill the slot vacated by Mr. Greenberg and to develop a pipeline of additional potential directors. Nine members are desired for an odd number vote and so that each member only serves on three committees.

FULL BOARD MEETINGS

The full Board of Directors meets a minimum of five times per year in February, May, August, October, and December. The Board of Directors hears presentations from senior Aqua America functional executives at each Board meeting as well as presentations from Aqua America specialists and consultants on topics of interest. All Board and Committee meetings have agendas and minutes.

BOARD OF DIRECTORS COMMITTEES

In addition to operating as a full Board, the Board has five committees for various special purposes:

- Executive Committee
- Executive Compensation Committee
- Audit Committee

- Risk Mitigation and Investment Policy Committee
- Corporate Governance Committee

The 2017 Proxy membership of each Committee is shown in the following exhibit.

Aqua America Board of Directors Committee Membership

Board Member	Executive Committee	Executive Compensation Committee	Audit Committee	Risk Mitigation and Investment Policy Committee	Corporate Governance Committee
DeBenedictis	Chair			X	
Franklin				X	
Burke		X	X		
Glanton	X			Chair	
Greenburg	X	Chair	X		
Hankowsky	X		Chair		X
Holland				X	X
Ruff	X	X			Chair

Each Committee has a written charter and is briefly described below.

Executive Committee

The Executive Committee is intended to serve in the event that action by the Board of Directors is necessary or desirable between regular meetings of the Board and when convening the entire Board is impractical. It is chaired by the Board Chair and the members are the Chairs of the other Board Committees. The Executive Committee can exercise all of the authority of the Board with specified exceptions. However, the Committee did not meet in 2016 or 2017.

Executive Compensation Committee

The Executive Compensation Committee reviews the recommendations of the Chief Executive Officer for the compensation of the Aqua America executive officers other than the Chief Executive Officer and determines the compensation of those officers. The Committee also reviews and recommends to the full Board the compensation for the Chief Executive Officer. The Executive Compensation Committee met ten times in 2016 because it was reviewing the whole compensation package. Normally, the Committee would meet six to eight times per year. The Committee meets without management at every meeting.

The Aqua America Executive Compensation Committee uses a compensation consultant which recommends salary and short-term, long-term, and equity incentive packages for each of the top 14 Aqua America executives. Please see Chapter V, Human Resources, for more information on executive compensation.

Audit Committee

The primary responsibilities of the Audit Committee are to monitor the integrity of the Aqua America financial reporting process and systems of internal controls, including the review of Aqua America's annual audited financial statements and to select, evaluate, and monitor Aqua America's independent registered public accounting firm. The Committee met ten times during 2016.

The Chair of the Audit Committee has one-half hour calls before each Board meeting with the Aqua America Chief Financial Officer, the outside auditing firm partner, and the head of Aqua America Internal Audit. The Chair meets with the Director of Internal Audit eight times per year. He is involved in the internal audit plan each year and participates in the year-end review of work. The discussions with the Director of Internal Audit consist of reviewing internal audit issues, planning the agenda for the Audit Committee meeting, discussing audits completed with highlights of the findings, and results from Sarbanes-Oxley Act (SOX) testing. In order to ensure that audit findings and recommendations are implemented, the Chair keeps a reminder file of audit items to be accomplished. Please see Chapter VI, Finance and Accounting, for more information on external and internal audits.

Risk Mitigation and Investment Policy Committee

In addition to the four directors, the Risk Mitigation and Investment Policy Committee includes the Aqua America Chief Financial Officer as a member. The Committee oversees the Aqua America risk management process, policies, and procedures for identifying, managing, and monitoring critical risks, including cyber related risks, and its compliance with legal and regulatory requirements. The Committee also oversees the Aqua America water and wastewater system acquisition process and reviews all larger acquisitions. The Committee met nine times in 2016.

Please see the Strategic Planning Process and Plans section and the Enterprise Risk Management sections below for more information on the Aqua America acquisitions and risk management processes.

Corporate Governance Committee

The Corporate Governance Committee advises the full Board on director nominees and executive selections and succession, including ensuring there is a succession plan for the Chief Executive Officer and other senior executive officers. The Committee met eight times in 2016.

Aqua America has implemented a number of governance enhancements, including:

- Annual Board assessments
- Bi-annual Board peer assessments
- Annual evaluation of Board committees by the Center for Board Governance
- Switch to an annual retainer for Board members instead of a per meeting fee
- Term limits for Board members (15 years) although the existing Board members were grandfathered with no term limitation, except Ms. Burke and Mr. Hilferty
- Required Board committee chair rotations

Management Representatives to Board Committees

The General Counsel and Secretary is involved in all Board activities including all general and committee meetings. He is responsible for all agendas and minutes. He is also the management representative for the Governance Committee.

The management representatives for the other Board Committees are the Chief Financial Officer for the Audit Committee, the Senior Vice President for Human Resources for the Compensation Committee, and the Executive Vice President, Strategy and Corporate Development and the Executive Vice President and Chief Operations Officer for the Investment and Risk Committee.

Director Compensation

For 2017, each independent director (all, except Franklin as a current employee of Aqua America, and Mr. DeBenedictis as Chairman) received annual compensation of $75,000 cash plus $75,000 equity (stock). In addition, the Chairman of the Board received $175,000 cash plus $75,000 equity, the Lead Independent Director received $25,000, the Chairs of the Audit and Executive Compensation Committees received $12,500 each, and the Chairs of the Corporate Governance and Risk Mitigation Committees received $10,000 each. Total compensation for directors serving the full year in 2016 ranged from $156,225 for Mr. Holland, a member of two committees, to $271,225 for the Chair of the Board.

FINDINGS

1. With the exception of the current and former CEOs, the Board lacks significant, recent experience with water and wastewater utilities.

There is one director who was the Chair of the Pennsylvania Public Utilities Commission years ago who was involved in the regulation of water and wastewater utilities and currently has involvement in local utility financing. However, only the current and former CEO members of the Board have practical management experience with water and wastewater utilities. Aqua America points out that the few other investor owned water and wastewater utilities' executives are considered competitors and not candidates for the Aqua America Board.

The Aqua America Board does have several Directors with experience with large-scale electric and gas utilities. However, large-scale electric and gas utilities with regulated and unregulated electric generation and interstate transmission of electric and gas are not directly comparable to a set of multiple, mostly small water and wastewater systems such as Aqua America. For example, Aqua NJ has 35 different water and wastewater systems to serve 58,000 connections.

While other investor owned water and wastewater utility executives may be ineligible for Aqua America Board membership, there are water and wastewater utility industry supplier and professional service executives who do have practical water and wastewater experience. Further, publicly owned water and wastewater utility executives who are not in the path of the Aqua America's acquisition strategy could lend practical water and wastewater utility experience to the Board. Several publicly owned water utilities are of similar scale to Aqua America in terms of connections and infrastructure.

2. With the exception of the director who retired at the end of 2017, the Board of Directors lacks experience with enterprises employing a growth-by-multiple-small-acquisitions strategy.

The only Director with practical experience with a "roll-up" growth-by-multiple-small-acquisitions strategy other than the current and former Aqua America CEOs, retired at the end of 2017. Several directors have experience with very large real estate and corporate acquisitions and some with large-scale electric and gas utility acquisitions. However, this experience is not comparable to Aqua America's strategy of multiple small acquisitions each year.

3. The scope of the Board's Risk Mitigation and Investment Policy Committee may be too broad.

While acquisitions and divestitures carry risk, they are only one type of risk. There are many other types of risk as noted in the Enterprise Risk Management section below. The evaluation of potential acquisitions and divestitures is specialized and this function requires frequent, active participation by Board members. The consideration of other types of risks is not the same as the evaluation of acquisition and divestiture types of risks. It may be better to reassign the risk mitigation function to the Audit Committee as it is more in line with its function of overseeing Aqua America's financial integrity.

4. The Board's Governance Committee is charged with overseeing executive succession planning but there is no formal succession plan.

There are intentions to develop a succession planning process and plan including focusing on the 30 officer positions in two phases. The first phase includes identifying the competencies required for each specific position, the likely difficulty that will be encountered filling the position, if vacated, and the likely urgency of replacement. Backfilling positions under emergency circumstances will also be considered in the program. The second phase includes developing talent profiles for existing incumbents that identified leadership competencies and other skills. The next steps include identifying potential successors for some internal positions with impending vacancies. The intent is to expand the succession planning process to the Director and Manager levels which includes approximately 70 positions. However, this program has not been implemented. The Board does not have a comprehensive executive succession plan in hand.

RECOMMENDATIONS

1. Aqua America should consider recruiting directors with water and wastewater utility experience. (See Finding 1)

Aqua America has several directors with large-scale electric and natural gas utility executive experience. However, this experience is not particularly relevant to the much different water and wastewater utility business of Aqua America with dozens of separate small water and wastewater utility systems. While there are few investor-owned utility executive Board candidates with water and wastewater experience, there are water and wastewater utility vendor and professional services executives who do have practical water and wastewater experience. Further, publicly owned water and wastewater utility

executives would bring practical experience with water and wastewater operations to the Board.

2. **Aqua America should consider recruiting directors with experience with enterprises employing a growth-by-multiple-small-acquisitions strategy. (See Finding 2)**

While some of the directors have experience with large-scale corporate, real-estate, and infrequent electric and natural gas utility acquisitions, the only director with experience with a "roll-up" growth-by-multiple-small-acquisitions strategy retired in 2017. The infrequent acquisitions of large-scale enterprises are not comparable to the frequent, small-scale acquisitions strategy of Aqua America. There are other enterprises with "roll-up" growth-by-multiple-small-acquisitions strategies that could be mined for director candidates.

3. **Consider reassigning the responsibilities for risk evaluation and mitigation oversight to the Board Audit Committee. (See Finding 3)**

The risk mitigation and investment policy functions are different and the risk mitigation function is more aligned with the Audit Committee's other functions than the investment policy function.

4. **Have the Governance Committee require a formal executive succession plan from Aqua America and review it at least semi-annually. (See Finding 4)**

Executive succession and selection are important functions of the Board Governance Committee and should receive its full attention. A high priority should be placed on developing and implementing a formal executive succession plan for Board approval and the Governance Committee should be fully involved in overseeing the selection of new Aqua America senior executives.

C. CORPORATE GOVERNANCE

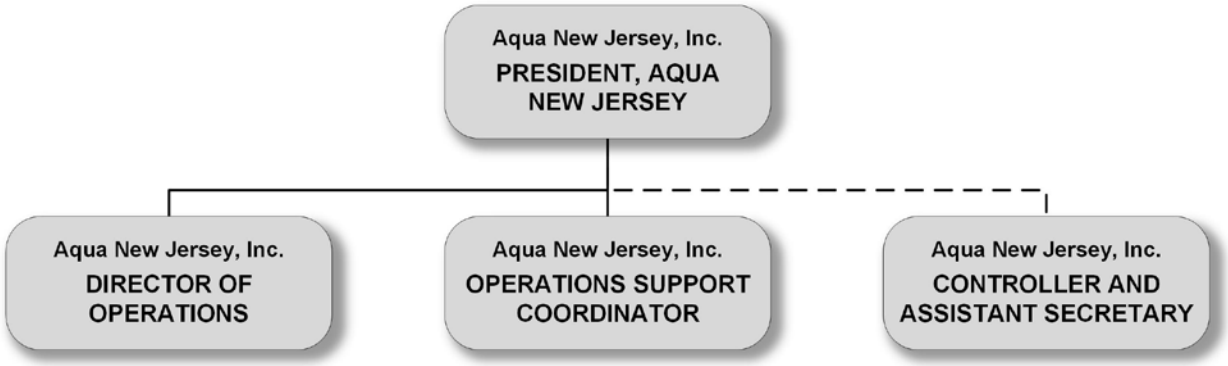
Aqua America executives are employees of Aqua Services. Aqua NJ leadership and functional managers report directly and indirectly to Aqua Services executives and functional managers in a matrix structure as described below.

SENIOR MANAGEMENT

Aqua NJ Organization Structure

The President of Aqua NJ reports to the Aqua America Deputy Chief Operating Officer. The Aqua NJ President has two direct reports and one indirect report, as shown in the following exhibit.

Aqua NJ Organization Structure



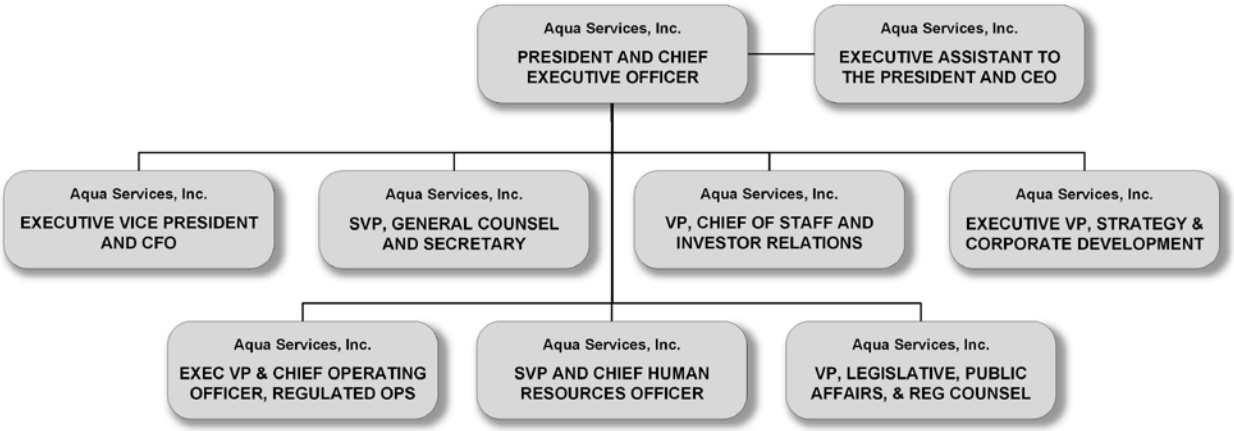
The Aqua NJ Director of Operations supervises all water and wastewater capital programs and operations. The Operations Support Coordinator provides various types of administrative support to the President and the New Jersey operations. The Aqua NJ Controller and Assistant Secretary reports directly to a Regional Controller who is an Aqua Pennsylvania employee but part of the Aqua Services structure. She provides accounting and regulatory support to Aqua NJ. Aqua NJ has 49 employees spread over four geographic divisions and the headquarters operation.

Late in 2017, a new business development specialist was hired to assist the Aqua NJ President in the acquisition of water and wastewater systems.

Aqua Services Organization Structure

Aqua America is led by a President and Chief Executive Officer (CEO) who reports to the Board of Directors. The CEO has seven direct reports in addition to an Executive Assistant as shown in the following exhibit.

Aqua Services Organization Structure



There are no plans to change the current top-level organization structure. Each of the direct report's functions are described briefly below.

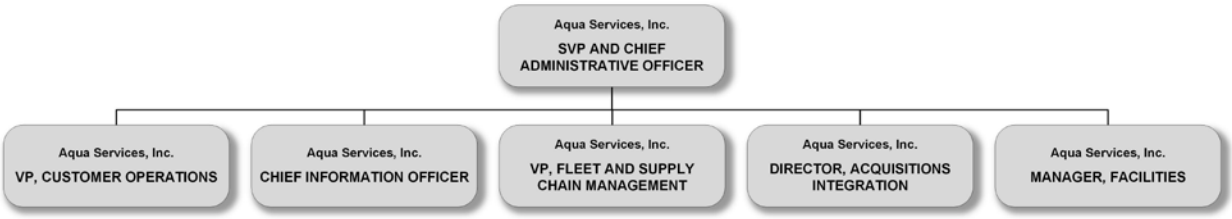
Executive Vice President and Chief Financial Officer. The Executive Vice President and Chief Financial Officer (CFO) has four direct reports:

- Senior Vice President, Chief Accounting Officer, Controller, and Assistant Treasurer
- Senior Vice President and Chief Administrative Officer
- Vice President and Treasurer
- Vice President, Tax

The CFO's current organization structure has been in place since July 2015 when the former CEO retired and the new CEO took office. At that time, an executive who reported to the CEO in charge of Information Technology, Fleet, Supply Chain, and the capital program retired. That position was eliminated and a new Chief Administrative Officer (CAO) position was created to supervise the Customer Service, IT, Fleet, and Supply Chain functions. At the same time, the Vice President for Legislative, Public Affairs, and Regulatory Counsel position began reporting directly to the CEO instead of the CFO. Investor Relations reports directly to the CEO, although the CFO is involved in investor relations presentations.

The CAO's organization structure is shown in the following exhibit.

Chief Administrative Officers Organization Structure



The Customer Operations group and the Director of Acquisitions Integration are described in Chapter IV, Customer Service; the Chief Information Officer's unit is explained in Chapter VI, Finance and Accounting; and the Fleet and Supply Chain Management organization and Facilities functions are covered in Chapter III, Systems Operations.

Senior Vice President, General Counsel, and Secretary. The Senior Vice President, General Counsel, and Secretary (General Counsel) supervises the Internal Audit and Legal Departments, including the risk management function. He also supervises a paralegal who assists with corporate secretary, insurance, and auto safety record keeping functions. As the Corporate Secretary, he fulfills all legally required duties of the Corporate Secretary for Aqua NJ and Aqua America. The General Counsel is responsible for the proxy statements, quarterly Securities and Exchange Commission (SEC) Forms K and Q certifications, external auditor representations, Financial Accounting Standards Board (FASB) insurance reserves, the Dividend Reinvestment Plan (DRIP), Employee Stock Purchase Plan (ESPP), and all SEC and New York Stock Exchange (NYSE) filings and disclosures. The Human Resources department used to report to the General Counsel but no longer does. Please see the Legal Department section below for more information on the Legal Department and Chapter VI, Finance and Accounting, for more information on the Internal Audit function.

Vice President, Chief of Staff, and Investor Relations Manager. The Vice President, Chief of Staff, and Investor Relations has two subordinate positions, both of which were

open during the audit. The Chief of Staff and Investor Relations Manager is primarily an individual contributor.

The Chief of Staff has many functions, including:

- Coordination of executive compensation
- Coordinating the setting of annual "priorities." The 2018 priorities were being set in December of 2017.
- Coordinating the CEO's communications (press releases and memoranda)
- Setting the Senior Leadership Team (SLT) and Executive Leadership Team (ELT) agendas
- Coordinating with the SLT members
- Coordinating development of "The Plan" (please see the Strategic Planning section below)
- Assembling, formatting, and distributing Board of Director meeting materials
- Coordinating Board of Director meeting logistics
- Sitting in on various meetings to provide cross-functional coordination
- Onboarding of new executives

However, the Chief of Staff is not a gate-keeper to the CEO.

The Investor Relations responsibility also has several functions:

- Transfer Agent relationship management (e.g., employee stock plan, dividend reinvestment plan, and stock ledger)
- Parts of the annual report, proxy, and quarterly earnings reports
- The investor page on the Aqua America website
- Buy and sell side stock analyst relationships
- Investor conference coordination and presentations

During the audit, the Chief of Staff and Investor Relations Manager was serving as the interim Human Resources (HR) manager as well. As interim head of HR, the Vice President is:

- Restarting the stalled Human Resource Information Management project in January 2018. The Newly hired Director of Human Resources will be the Project Manager working with the project consultants
- Updating the succession plan
- Coordinating year-end performance appraisals, salary increases, and short-term incentive bonuses
- Coordinating the health insurance open enrolment period

Executive Vice President, Strategy and Corporate Development. The Executive Vice President, Strategy and Corporate Development (EVP) has two direct reports, an Aqua Pennsylvania employee who is the Marketing and Acquisition Coordinator and an Aqua Services Vice President of Corporate Development. The Vice President of Corporate Development was formerly the President of Aqua NJ. The Corporate Development group is focused on acquiring water and wastewater systems. The EVP

attends all regular Board meetings and all Investment Policy and Risk Mitigation committee meetings.

The Vice President of Corporate Development has three direct reports:

- Corporate Development Mergers and Acquisitions Analyst
- Corporate Development Financial Associate
- Corporate Development Marketing Analyst

The Corporate Development Vice President also has dotted line relationships to the business development personnel who report directly to the state presidents, including the new Aqua NJ business development specialist. The state business development personnel report directly to their respective state presidents but have strong ties to the Aqua America business development function. Please see the Strategic Planning section below for more information on the corporate development function.

Executive Vice President and Chief Operating Officer, Regulated Operations. The Executive Vice President and Chief Operating Officer, Regulated Operations (COO) has multiple direct reports: several state presidents, the Senior Vice President for Engineering and Environmental Affairs, and the Deputy Chief Operation Officer. In 2016, the Director of Corporate Engineering became the president of Aqua Pennsylvania and the former Aqua NJ Chief Engineer became the Aqua Director of Corporate Engineering. Please see Chapter III, System Operations, for more information on the COO's organization.

Senior Vice President and Chief Human Resources Officer. During the audit, the Senior Vice President and Chief Human Resources Officer's (CHRO's) position was filled with a relatively new, less-than-one-year, person. However, the CHRO left the position suddenly during the audit. The CHRO position has five positions reporting to it that include the following:

- Director, Human Resources
- Manager, Employee and Labor Relations
- Manager, Benefits
- Manager, Human Resource Business Partners
- Executive Assistant and Receptionist

Please see Chapter V, Human Resources, for more information on this function.

Vice President, Legislative, Public Affairs, and Regulatory Counsel. The Vice President, Legislative, Public Affairs, and Regulatory Counsel's organization includes:

- A part-time Regulatory Counsel who handles Pennsylvania formal complaints
- A Director of Marketing and Communications who supervises two Communications Managers, one for New Jersey, Illinois, and North Carolina, and one for Texas, Virginia, Human Resources, and Information Technology
- A Regulatory Counsel who assists with all regulatory cases, including New Jersey. The Regulatory Counsel is assisted by a Rate Analyst.

- An Aqua Pennsylvania state lobbyist
- An Aqua Pennsylvania employee who manages the Aqua Pennsylvania Foundation

The Vice President is also an individual contributor who personally manages all regulatory proceedings. Please see the External Relations section below for more information on this organization.

MANAGEMENT COMMITTEES AND OPPORTUNITY MEETINGS

Management Committees

The two Aqua America general management level committees are:

- Executive Leadership Team (ELT) consisting of the CEO, COO, EVP Strategy and Corporate Development, CFO, and the General Counsel
- Senior Leadership Team (SLT) consisting of the ELT plus the SVP Engineering and Environmental Affairs, SVP Human Resources, CAO, CIO, and Treasurer

These committees meet regularly and are focused on communications, program and project management, and resolving inter-departmental issues.

State Opportunities Meetings

The principle formal communication and management venue between Aqua NJ and its Aqua Services counterparts is the monthly State Opportunities Meeting. These meetings are held regularly between the Aqua Services executives and staff and each of the eight state operations, including Aqua NJ. The Aqua NJ participants can include the President, Controller, Engineer, Director of Operations, Environmental Compliance Manager, and the three Division Superintendents. The Aqua America participants can include the Chairman of the Board, the Chief Executive Officer and the entire executive management team, the Chief Operating Officer, Deputy Chief Operating Officer, SVP of Engineering and Environmental Affairs, Regulatory Counsel, Regional Controller, Customer Operations Aqua NJ Representative, Human Resources Aqua NJ Business Partner, and the Legal Department Aqua NJ Representative. Specialists needed for a particular issue could also be invited.

The Aqua NJ State Opportunities meetings each cover:

- Financial results and projections
- Rate Cases
- Capital projects
- Growth
- Compliance
- Customer Service
- Operations
- Legal
- Regulatory Affairs

FINDINGS

1. The hybrid centralized and decentralized governance structure is effective for Aqua NJ.

Aqua NJ is the water and wastewater utility regulated by the New Jersey Board of Public Utilities. It is not a particularly large water and wastewater utility, serving just 53,000 customers. However, it receives direction and assistance from the much larger Aqua America through the Aqua Services legal entity.

The Aqua NJ President is clearly accountable for the financial performance, business development, community and state governmental relations, safety, and legal and regulatory compliance of Aqua NJ. The Aqua NJ President reports to the Aqua America Deputy Chief Operating Officer and is responsible for ensuring that Aqua NJ meets its financial and regulatory commitments.

However, the Aqua NJ President does not have a full complement of water and wastewater management, operations, and administrative functions on his staff. Aqua NJ only provides directly for itself the capital program and the operations and maintenance of its water and wastewater systems. Most other business functions are provided by Aqua Services and Aqua Pennsylvania legal entities, including:

- Customer Service except for the meter reading and field service performed by Aqua NJ employees
- Finance and Accounting (The Aqua NJ Controller and her staff are Aqua NJ employees but she reports directly through the Aqua Services organizations structure.)
- Legal and Corporate Secretary
- Internal Auditing
- Investor Relations
- Human Resources
- Information Technology

In addition, several Aqua America functions heavily support Aqua NJ, including:

- Engineering and the Capital Program
- Environmental Affairs
- Safety
- Field Service Automation and Dispatch
- Asset Management
- Business Development (acquiring additional water and wastewater systems)
- Rate Cases and other Regulatory Responsibilities
- New Jersey Legislative and Public Affairs

In several cases, Aqua Services has assigned individual Aqua Services staff counterparts to serve Aqua NJ, including:

- Accounting and Regulatory (collocated at the Aqua NJ headquarters)
- Legal

- Business Development
- Human Resources

The assignment of corporate staff counterparts to an operating utility subsidiary is a good practice. The assigned personnel become de facto management team members of Aqua NJ and learn the unique needs of Aqua NJ.

This mix of centralized and decentralized functions is working well for Aqua NJ. The provision of staff services and support provides Aqua NJ with the concentration of expertise and economies of scale available from the larger Aqua Services organization.

2. The formal mission, vision, and core values of Aqua NJ and Aqua America are the same.

The mission of Aqua America and Aqua NJ is, "Protecting and providing earth's most essential resource."

The vision of Aqua America and Aqua NJ is:

> *At Aqua America, we know that water is a precious resource – one that plays a critical role in sustaining life. We take seriously our responsibility to protect and provide this essential resource. We are committed to sustainable business practices; excellent customer service; attracting and developing top talent; the strategic growth of our company; delivering shareholder value; investing in technology and infrastructure; and giving back to the communities in which we operate. We do all these with integrity and transparency.*

The goals and objectives of Aqua America and Aqua NJ are: "Integrity, Respect, and Excellence."

3. Aqua NJ and Aqua America do not keep and circulate minutes of the management committee meetings and Opportunity Meetings.

The practice of recording and circulating minutes of formal management and technical meetings is a good practice. It provides documentation of responsibilities for action items identified at the meeting for follow-up by supervisors and at subsequent meetings and provides communication of the meeting results to persons unable to attend and to superior managers and executives.

4. The Aqua America corporate structure provides adequate separation between Aqua NJ regulated operations and the Aqua America unregulated operations and there are no apparent conflicts of interest.

Aqua America has divested most of its unregulated operations and there are no Aqua America unregulated entities operating directly in New Jersey. The Aqua NJ President reports to the Aqua America Deputy Chief Operating Officer who has no unregulated responsibilities other than overseeing Aqua America's contract water and wastewater operations. Also, of the many Aqua America staff counterparts to Aqua NJ, few have regular responsibilities for the Aqua America unregulated operations. The only exceptions appear to be Corporate Development which manages the Aqua America interest in the water pipeline joint venture and the General Counsel who serves all of the Aqua America regulated and unregulated subsidiaries as the General Counsel and

Corporate Secretary. However, both Corporate Development and the Legal Department have individuals assigned to Aqua NJ who have little unregulated subsidiary involvement.

5. The important functions of Customer Operations and Information Technology are relegated to the fourth level in the Aqua America organization structure.

Customer Operations and Information Technology report to the Chief Administrative Officer who reports to the Chief Financial Officer who reports to the Chief Executive Officer. It is unusual for these important functions to be placed so low in a large enterprise's organization structure. It communicates, likely unintentionally, that these functions are less important than other functions placed higher in the organization structure. The lower organizational placement could also delay decision making as an additional level of approval is needed.

6. Aqua America relies heavily on contractors but there is no centralized services contracting support.

Aqua America has approximately 1600 employees, of whom approximately 90% are operating personnel. Aqua Services and Aqua NJ contract for a number of their services which reduces the number of employees. Contracted functions include:

- Aqua NJ capital program engineering and construction
- Aqua NJ operations and maintenance requiring crews, heavy equipment, or specialized expertise
- Aqua NJ litigation and specialized legal services
- Aqua NJ lobbying
- Customer Operations outsources bill printing and mailing, the lockbox, and collections
- Many Information Technology development, implementation, and maintenance services

Services contracting can be a good practice as long as core capabilities are maintained. It provides flexibility of workforce capabilities to deal with the ebb and flow of workload and it permits the application of specialized expertise as needed. Services contracting and contractor management is a core management function at Aqua Services and Aqua NJ.

However, the oversight of services contracting is not centralized as it typically is in other utility holding companies and there is no identified management training for services contracting and contractor management. There are no written policies or procedures for services contracting and contractor management as there are for materials procurement.

The Supply Chain organization has responsibility for all materials contracting and purchasing but no responsibility for services contracting other than for its own needs. It also does not provide services contract management and administration services.

Because of the large-scale of services contracting within Aqua America and Aqua NJ, it is a core management function and worthy of the highest level of management

attention. Services contracting carries multiple risks, including: fraud by the contracting and contract management employees, fraud by the contractor, and poor execution of the contracts. While the scope of this audit did not include investigation of contracting and contractor management risks, it did confirm that the lack of centralization of oversight and formal procedures and training makes Aqua NJ and Aqua America vulnerable to the risks.

RECOMMENDATIONS

1. **Keep and circulate minutes for the management committee meetings and the Aqua NJ Opportunities Meetings. (See Finding 3)**

While most formal meetings and the Aqua NJ Opportunities Meeting employ advance agendas, it is rare for there to be minutes kept and circulated to invitees and attendees after the meeting. This reduces the effectiveness of meetings. In particular, it is helpful to note all action items and responsibilities determined in the meeting. Then, supervisors can ensure that all responsible parties accomplish the action items assigned to them in a timely fashion. It is a good practice for all formal meetings to have prior agendas and post meeting minutes. For example, all Board of Directors full Board and Committee meetings have both agendas and minutes.

2. **Consider placing Customer Operations and Information Technology higher in the organization structure. (See Finding 5)**

Executive spans of control can extend to six to eight direct reports in addition to the administrative assistants. For example, the Chief Executive Officer's current span of control is seven, not counting the administrative support. If each direct report to the CEO had seven direct reports, 49 departments could be at the third level of the organization structure. Currently, there are only 25 departments at the third level. The Chief Administrative Officer position could be redeployed and the current direct reports to the CAO, including Customer Operations and Information Technology, reallocated to other second level executives.

3. **Develop a services contracting function in the Supply Chain organization. (See Finding 6)**

Having a centralized services contracting function is a good practice for large enterprises, particularly ones which rely on contractors heavily. A centralized services contracting function should develop, implement, and oversee standardized contracting, contracts, contractor management, and contract administration policies, procedures, and systems. While appropriate functional and local involvement in services contracting should be maintained, the centralized function should ensure that all services contracting policies and procedures are followed including review of all new and renewed services contracts. Additionally, one or more Legal Department attorneys should be assigned to support the centralized services contracting functions as they are assigned to support operating companies like Aqua NJ and other Aqua Services functions like Information Technology and Human Resources.

D. STRATEGIC PLANNING PROCESS AND PLANS

STRATEGIC PLANNING

Aqua America is focused on its growth-by-acquisition of regulated water and wastewater systems strategy. It has divested most of its nonregulated operations and is not growing its contract water and wastewater system operations. Aqua America derives 96% of its operating revenue from regulated water and wastewater systems. Aqua America is pursuing the acquisition of water and wastewater systems, primarily within the eight states it operates, including New Jersey. The CEO would like to accelerate Aqua America's growth rate.

Water and wastewater system acquisitions is an important component of building the Aqua America rate base, along with replace and renew capital expenditures and some organic growth of new developments and connections.

GROWTH-BY-ACQUISITION STRATEGY

Following is Aqua America's explanation of its growth-by-acquisition strategy in the 2016 Aqua America, Inc. 2016 SEC Form 10-K:

> *Part of the Aqua America strategy to meet industry challenges is to actively explore opportunities to expand its utility operations through acquisitions of water and wastewater utilities either in areas adjacent to its existing service areas or in new service areas, and to explore acquiring market-based businesses that are complementary to the regulated water and wastewater operations.*
>
> *To complement the growth strategy, Aqua America routinely evaluates the operating performance of the individual utility systems, and in instances where limited economic growth opportunities exist or where Aqua America is unable to achieve favorable operating results or a return on equity that it considers acceptable, Aqua America will seek to sell the utility system and reinvest the proceeds in other utility systems.*
>
> *Consistent with this strategy, Aqua America is focusing its acquisitions and resources in states where it has critical mass of operations in an effort to achieve economies of scale and increased efficiency. Another element of the growth strategy is the consideration of opportunities to expand by acquiring other utilities, including those that may be in a new state, if they provide promising economic growth opportunities and a return on equity that is considered acceptable.*
>
> *During 2016, Aqua America completed 19 acquisitions, which, along with the organic growth in existing systems, represented 15,282 new customers. During 2015, Aqua America completed 16 acquisitions, which, along with the organic growth in existing systems, represented 17,747 new customers. During 2014, Aqua America completed 16 acquisitions, which, along with the organic growth in existing systems, represented 12,120 new customers.*
>
> *Aqua America believes that utility acquisitions, organic growth, and expansion of its market-based business will continue to be the primary sources of growth. With approximately 53,000 community water systems in the U.S., 82% of which serve less than 3,300 customers, the water industry is the most fragmented of the*

major utility industries (telephone, natural gas, electric, water, and wastewater). In the states where Aqua America operates regulated utilities, there are approximately 14,500 community water systems of widely varying size, with the majority of the population being served by government-owned water systems.

Although not as fragmented as the water industry, the wastewater industry in the U.S. also presents opportunities for consolidation. According to the U.S. Environmental Protection Agency's (EPA's) most recent survey of wastewater treatment facilities (which includes both government-owned and privately-owned facilities), in 2012 there were approximately 15,000 such facilities in the nation serving approximately 76% of the U.S. population. The remaining population represents individual homeowners with their own treatment facilities, for example; community on-lot disposal systems; and septic tank systems. The vast majority of wastewater facilities are government-owned rather than privately-owned. The EPA survey also indicated that there were approximately 4,000 wastewater facilities in operation in the states where Aqua America operates regulated utilities.

Because of the fragmented nature of the water and wastewater utility industries, Aqua America believes that there are many potential water and wastewater system acquisition candidates throughout the United States. It believes the factors driving the consolidation of these systems are:

- *The benefits of economies of scale*
- *The increasing cost and complexity of environmental regulations*
- *The need for substantial capital investment*
- *The need for technological and managerial expertise*
- *The desire to improve water quality and service*
- *The limited access to cost-effective financing*
- *The monetizing of public assets to support, in some cases, the declining financial condition of municipalities*
- *The use of system sale proceeds by a municipality to accomplish other public purposes*

Aqua America is actively exploring opportunities to expand its water and wastewater utility operations through regulated utility acquisitions or otherwise, including the management of publicly-owned facilities in a public-private partnership. Aqua America intends to continue pursuing acquisitions of government-owned and privately-owned water and wastewater utility systems that provide services in areas near its existing service territories or in new service areas. Aqua America's intends to focus on growth opportunities in states where it has critical mass, which allows it to improve economies of scale through spreading the fixed costs over more customers – this cost efficiency should enable the reduction in the size of future rate increases.

CORPORATE DEVELOPMENT FUNCTION

At Aqua America, "corporate development" and "business development" normally mean the acquisition of water and wastewater systems, either publicly or privately owned. It is also possible that Aqua America could acquire another company that owns water and wastewater systems as well.

The Corporate Development group is focused on acquiring water and wastewater systems. The acquisitions are characterized as "strategic," meaning more than 25,000 connections or "municipal," meaning less than 25,000 connections. The minimum size acquisition is 2,500 connections except for troubled systems the states request Aqua America to acquire.

All states, including New Jersey, have one or more business development (acquisitions) specialists assigned to the state president. These specialists also have a strong dotted line relationship to the Corporate Development function, particularly the Vice President, Corporate Development.

The states, including New Jersey, are responsible for identifying and qualifying new acquisition prospects. Then the Corporate Development unit gets involved to further analyze and evaluate the prospect and to determine whether the proposed acquisition price is reasonable. The states perform the due diligence analysis of prospective acquisitions with teams of operating, engineering, and accounting personnel.

There is an internal Investment Committee chaired by the Executive Vice President, Strategy and Corporate Development that reviews potential acquisitions.

NEW JERSEY ACQUISITIONS

There are two types of possible acquisitions in New Jersey, publicly owned and privately owned. All of the recent acquisitions have been privately owned negotiated transactions. The individual state companies are responsible for identifying and prioritizing acquisition targets. However, it appears that Aqua NJ is more reactive in that it typically responds to requests for quotation.

Publicly owned water and wastewater systems in New Jersey first issue a request for acquisition proposal, typically in the spring, receive proposals and select an acquirer in the summer, and then hold a referendum on the sale in November.

Even though Aqua NJ is a small operation within Aqua America, it is still expected to make acquisitions proportionate to its size, even though the small New Jersey purchases have little impact on the overall Aqua America results. Once Aqua NJ acquires new water systems, it works to bring them under a single water tariff for New Jersey. New Jersey wastewater operations are small and not contiguous and do not operate under a single tariff.

FINDINGS

1. There is no strategic planning process and there is no strategic plan.

There is no strategic plan. There is a five-year financial plan with assumptions about acquisitions, inflation, operating expenses, and staffing that is as close as there is to a strategic plan, particularly if taken along with Wall Street guidance. In addition, the state companies, including Aqua NJ, have a "rate model" that forecasts financial results going forward to determine when rate cases must be filed to maintain targeted returns.

The CFO presents the five-year plan to the Board each year along with the assumptions, major capital items, and a risk assessment. It is focused on achieving the targeted revenue and earnings streams. The first year of the five-year plan is the next year's detailed capital and operating budget, including employee levels. It is presented to the Board in October and approved in December.

There was the beginning of an initiative to develop a formal Aqua America strategic plan in 2017. This was a CEO initiative being facilitated by the Chief of Staff. Aqua America did not use a consultant. The effort was based on the CEO's vision for the company developed while he was the COO and presented to the Board during his CEO selection process. The vision has been largely implemented over the last two years since his appointment as CEO.

The 2017 strategic planning effort did not produce a strategic plan but did produce "The Plan," a list of initiatives and a calendar of important corporate activities throughout the year. The Chair of the Board did not recognize "The Plan" and thought it might be the acquisition campaign presented by the Corporate Development group on how to achieve targeted customer, rate base, and revenue growth. "The Plan" is not reviewed at the State Opportunities meetings.

While the five-year financial plan is a good practice, it is also a good practice to have a strategic planning process and strategic plan that is renewed annually. The strategic plan should give solid guidance to the financial plan and to each function within Aqua America and Aqua NJ in developing their subordinate plans, including Information Technology, Human Resources, and regulated state operations.

2. New Jersey laws both encourage and discourage the acquisition of additional New Jersey water and wastewater systems by Aqua NJ or others.

There are several New Jersey laws that both encourage and discourage the acquisition of water and wastewater systems: the Fair Market Value Law, Voter Referendum, Water Quality Accountability Act, and the Water Infrastructure Protection Act. Each is discussed below.

Fair Market Value

New Jersey has a 2015 "fair market value" law that allows acquiring companies to put the independent appraisal value or competitively bid acquisition prices for the acquisition in the rate base rather than the depreciated original cost. This applies to the acquisition of systems up to Aqua NJ's current size of approximately 60,000 connections. This makes acquisitions more attractive to Aqua America as the acquisition price could be greater than the depreciated original cost.

Voter Referendum

The New Jersey R.S. 40:62-3 et seq Ordinance Authorizing Sale or Lease; Laws Governing requires a voter referendum for the sale of publicly owned utilities. Aqua NJ has been the successful bidder to acquire publicly owned utilities three times but the voter referendum has failed in each case and Aqua NJ did not acquire the systems. In a recent case, Westville, NJ decided to sell its utility system to Aqua NJ. However, the voter referendum result was to not sell the system and the acquisition did not take place.

Water Quality Accountability Act

New Jersey passed a 2016 Water Quality Standards Act that requires all water systems in the state to meet the same regulatory Department of Environmental Protection (DEP) standards. That is, small systems will have to meet the same standards as large systems. The mayor or city manager of each publicly owned water and wastewater system has to attest annually that the system is meeting the standards with penalties for certifying non-compliant systems. This could encourage the sale of additional substandard water and wastewater systems in New Jersey to larger entities, like Aqua NJ, that have the scale, resources, and expertise to comply with environmental requirements.

Water Infrastructure Protection Act

The Water Infrastructure Protection Act allows the elected councils to declare their substandard systems as "emergent" permitting them to divest the systems without a voter referendum. This makes Aqua NJ optimistic about additional acquisition prospects in New Jersey. However, the additional emergent acquisition candidates will be substandard systems requiring significant capital and operating improvements to meet DEP regulations.

RECOMMENDATION

1. **Develop a strategic planning process that informs the subordinate functional plans. (See Finding 1)**

The use of a detailed five-year financial plan is a good practice and the development of "The Plan" in 2017 is the beginning of a strategic planning process that could eventually result in a strategic plan. Aqua America should build on this base to develop a strategic planning process that produces an original strategic plan that is then updated and renewed annually. The strategic plan should be consistent with the Aqua America mission, vision, and values and provide clear guidance to the financial plan subsidiary plans like the IT plan, the Human Resources plan, and the Aqua NJ plan.

E. CORPORATE PERFORMANCE MANAGEMENT

AQUA NJ

Aqua NJ has a 2017 Scorecard of monthly performance metrics. There are five categories of metrics:

- Fiscal Responsibility – seven metrics (please see Chapter VI, Finance and Accounting, for more information on these metrics)

- Operations Management – 17 metrics (please see Chapter III, System Operations, for more information on these metrics)
- Customer Operations – four metrics (please see Chapter IV, Customer Service, for more information on these metrics)
- Meter Operations – seven metrics (please see Chapter IV, Customer Service, for more information on these metrics
- Environmental Compliance – five metrics (please see Chapter III, System Operations, for more information on these metrics)

The Scorecard is produced monthly by the Aqua NJ Controller and is reviewed during the Opportunities Meetings between the Aqua Services executives and staff and the Aqua NJ leaders and specialists.

AQUA AMERICA

According to the Aqua America CEO, the Proxy Statement details the short-term and long-term incentive programs which are, essentially, the Aqua performance management metrics. (Please see Chapter V, Human Resources, for more information on the short-term and long-term incentive programs.)

FINDINGS

1. The Aqua NJ Scorecard is a good start but needs further development.

The Aqua NJ Scorecard has explanatory columns for each of the 40 metrics consisting of: Period (e.g., year-to-date or month), Format (e.g., percent or dollars), 2016 results, American Water Works Association (AWWA) Benchmark Median (for 15 of the 40 metrics), Total Weight, and Points for the Short-Term Incentive Program (please see Chapter V, Human Resources, for more information on the Short-Term incentive program). Then there are sections with Weight, Target, Actual, and Score for the President, each of the three Division Superintendents, the Manager of Water Quality, and the Operations Support Coordinator. The metrics for each of the positions, other than the Aqua NJ President, are a subset of the total metrics applicable to each position. For example, the Division Superintendents are not measured on the Customer Operations metrics and the Manager of Water Quality has only the five Environmental Compliance metrics.

However, the Scorecard has several opportunities for improvement:

- Additional or different performance metrics are recommended in Chapter VI, Finance and Accounting; Chapter IV, Customer Service; and Chapter III, System Operations
- It lacks employee safety metrics
- There is limited benchmark information and it is not clear how the benchmark information is used in setting targets
- All metrics do not have targets
- All metrics do not have actual measurements
- The State Engineer is not included in the Scorecard

2. Corporate performance management is the incentive compensation program at Aqua America in which 60% is focused on earnings per share, 15% is based on safety, 15% on water and wastewater regulatory compliance, and 10% is related to individual goals.

The Aqua America CEO states that corporate performance management is, essentially, the short-term and long-term incentive programs. That is, the performance aspects measured are the incentive program elements. The short-term incentive program elements are:

- 60% earnings per share
- 15% safety
- 15% water and wastewater regulatory compliance
- 10% individual goals, which could be financial or operational

The long-term incentive program element is return on equity.

Of the short-term and long-term incentive program elements, only 30% are directly related to operational performance relevant to Aqua NJ, such as customer service, environmental compliance, and reliability.

In addition, the 2016 Aqua America Securities and Exchange Commission Form 10-K explains the performance measures considered by management:

> *We consider the following financial measures (and the period to period changes in these financial measures) to be the fundamental basis by which we evaluate our operating results:*
>
> - *earnings per share;*
> - *operating revenues;*
> - *income from continuing operations;*
> - *earnings before interest, taxes, and depreciation ("EBITD");*
> - *earnings before income taxes as compared to our operating budget;*
> - *net income; and*
> - *the dividend rate on common stock.*
>
> *In addition, we consider other key measures in evaluating our utility business performance within our Regulated segment:*
>
> - *our number of utility customers;*
> - *the ratio of operations and maintenance expense compared to operating revenues (this percentage is termed "operating expense ratio");*
> - *return on revenues (income from continuing operations divided by operating revenues);*
> - *rate base growth;*

- *return on equity (net income divided by stockholders' equity); and*
- *the ratio of capital expenditures to depreciation expense.*

Furthermore, we review the measure of earnings before unusual items that are noncash and not directly related to our core business, such as the measure of adjusted earnings to remove the joint venture impairment charge, which was recognized in the fourth quarter of 2015. Refer to Note 1 – Summary of Significant Accounting Policies – Investment in Joint Venture in this Annual Report for information regarding the impairment charge. We review these measurements regularly and compare them to historical periods, to our operating budget as approved by our Board of Directors, and to other publicly-traded water utilities.

None of the "Performance Measures Considered by Management" address customer service, environmental compliance, or reliability.

3. There is no Aqua America or Aqua NJ benchmarking program.

Aqua America and Aqua NJ have done no benchmarking or best practices studies. The Deputy COO did purchase the publicly available American Water Works Association (AWWA) book of benchmarks but Aqua America and Aqua NJ have not participated in the AWWA benchmarking program.

Benchmarking studies are highly useful in setting appropriate performance targets for performance metrics. Performance actually achieved by high performing peer companies can be used to set reasonable targets for Aqua America and Aqua NJ.

Further, one of the ways Aqua Services can demonstrate that its shared services are providing good, cost effective service to Aqua NJ is for each function to participate in benchmarking programs on a periodic basis. There are commercially available benchmarking programs for all major staff functions, such as legal, human resources, and information technology, with companies of similar scale as Aqua America. For most staff functions, the benchmark panel does not have to be utility companies to provide meaningful comparisons.

RECOMMENDATIONS

1. Upgrade the Aqua NJ Scorecard. (See Finding 1)

The existing Aqua NJ Scorecard is a good start but can be improved by:

- Updating the performance metrics as recommended in Chapter VI, Finance and Accounting; Chapter IV, Customer Service; and Chapter III, System Operations
- Adding employee safety metrics
- Reporting more benchmarks and utilizing them in setting the targets
- Having targets for all metrics
- Having accurate actual measurements for all metrics
- Including the State Engineer in the Scorecard

Also, the current scorecard is a single page with lots of entries and very small print. Converting the scorecard to a multiple page document and adding graphic displays of

performance trends and success against targets would make the scorecard easier to use.

2. **Consider developing a separate corporate performance management program and reweight the Aqua America incentive compensation program to less financial performance measures and more operational performance measures relevant to Aqua NJ. (See Finding 2)**

A comprehensive corporate performance management program should be separate from, but linked to, the incentive compensation program. The corporate performance management program should reflect each element of the Aqua America mission, vision, and values. That is, it should measure the degree to which Aqua America is achieving its mission, vision, and values. Further, the corporate performance management system should encompass the performance factors important to the individual state companies like Aqua NJ: system reliability, water quality, safety, customer service, and regulatory and legal compliance. The corporate performance management program should be a centerpiece of the ELT and SLT meetings.

The major Aqua America short-term incentive element is 60% earnings per share. The ten percent individual goals element could be financial as well. Return on equity is 100% of the long-term incentive program. The SEC reported performance factors considered by management are 100% financial. The Aqua America incentive compensation program is overweighted to financial performance and underweighted to operational performance. The structure should be rebalanced to include more weight on system reliability, water quality, safety, customer service, and regulatory and legal compliance. .

3. **Develop a comprehensive benchmarking program. (See Finding 3)**

Aqua America and Aqua NJ should participate in the AWWA benchmarking program. Further, each major Aqua Services shared services function should participate in an appropriate benchmarking program at least every three years.

F. LEGAL DEPARTMENT

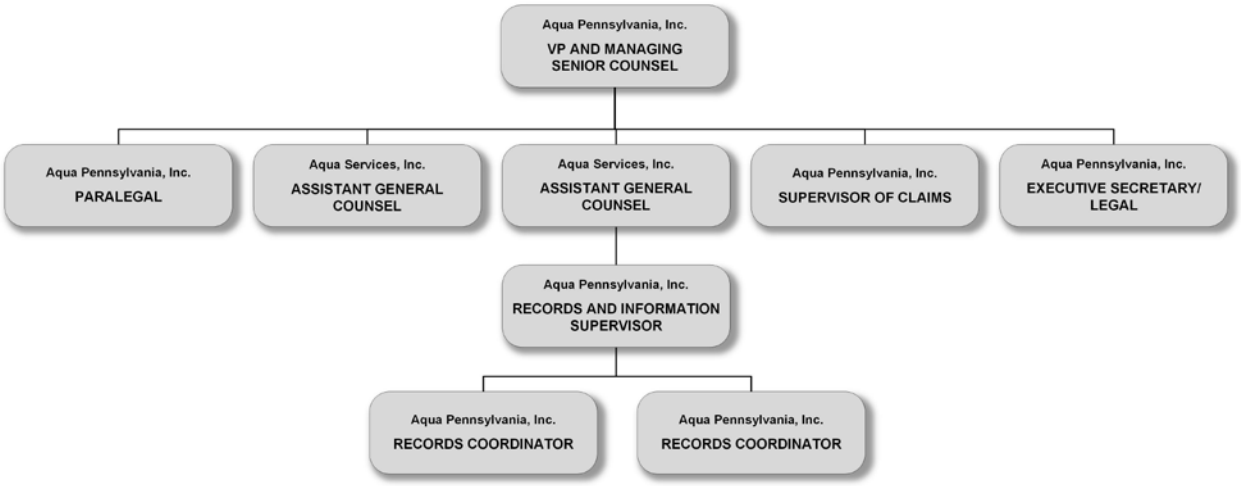
The Legal Department is part of the Senior Vice President, General Counsel, and Secretary's (General Counsel's) office. In addition to the Legal Department, the General Counsel has the Internal Audit Department and an Executive Assistant and Assistant Secretary reporting to him, as shown in the following exhibit.

General Counsel Organization Structure

Please see Chapter VI, Finance and Accounting, for a discussion of the Internal Audit unit.

The Legal Department reports to the Vice President and Managing Senior Counsel as shown in the following exhibit.

Legal Department Organization Structure



The Vice President and Managing Senior Counsel supervises the Legal Department and is the individual contributor attorney supporting Aqua Pennsylvania. She has five direct reports: a Paralegal, two Assistant General Counsels, a Supervisor of Claims, and an Executive Secretary. As the legal support person for Aqua Pennsylvania, she is involved in all legal matters to which she is invited except regulatory and labor relations law matters. She reviews all contracts submitted to her and participates in the Aqua Pennsylvania Opportunities Meetings.

The Paralegal assists the Vice President with Aqua Pennsylvania legal matters; handles Pennsylvania Public Utilities Commission formal and informal complaints; and motor vehicle accident administration for all states, including Aqua NJ.

The Supervisor of Claims handles all claims other than motor vehicle claims (e.g., dig-ins and property damage) for all states, including Aqua, NJ.

The Executive Secretary only supports the Vice President and not the other Legal Department employees.

The two Assistant General Counsels support the state companies other than Aqua Pennsylvania and support other Aqua America functions and programs as assigned. One Assistant General Counsel supports Aqua NJ, along with the Ohio, Indiana, and Illinois operating companies and the Enterprise Risk Management and insurance programs. The other Assistant General Counsel supports the other Aqua America state organizations: Texas, Virginia, and North Carolina, as well as the Human Resources (other than labor relations) and Information Technology departments.

The second Assistant General Counsel also supervises the Aqua America records management function which is staffed by a Supervisor and two Records Coordinators. The records management function administers retention schedules, inactive records

systems, and litigation-related records; coordinates off-site storage contractors; and trains and supports users of the records management systems.

The Assistant General Counsel assigned to Aqua NJ provides legal services for Aqua NJ as requested. If specialized services are required, the Assistant General Counsel will assist the Aqua NJ President in engaging an appropriate outside counsel for each need, if requested. The types of legal assistance provided to Aqua NJ include:

- Smaller acquisitions. Outside counsel may be engaged for larger acquisitions.
- Employment (except labor relations assistance which is provided by the Human Resources department)
- DEP environmental issues except for violations which are referred to outside counsel
- Contract reviews for new or changed contracts as requested. Standard form and unchanged contracts are typically not reviewed by the Legal Department.

The Assistant General Counsel is generally not involved in New Jersey legislation, labor relations, or regulatory matters.

The Assistant General Counsel assigned to Aqua NJ also is working on developing, implementing, and operating the Enterprise Risk Management program and the placement of insurance under direction of the General Counsel. Please see the Enterprise Risk Management section below for more information on this program.

There is no back-up for the attorney assigned to Aqua NJ. Succession would be outside counsel until a replacement is hired.

Aqua America makes extensive use of outside counsel. This includes areas of specialization in environmental law, litigation, large-scale mergers and acquisitions, and specialized contracts. Aqua NJ outsources for litigation and large mergers and acquisitions. The Legal Department does not keep records of outside counsel costs. The outside counsel costs are charged to the individual state companies, like Aqua NJ, or the Aqua America departments utilizing the service.

FINDINGS

1. The General Counsel's office does not include the regulatory counsels.

There are three attorneys doing legal work within Aqua America who are not in the Legal Department. The regulatory attorneys are in the Regulatory Department.

It is more typical for all practicing attorneys to report to the General Counsel's office. This encourages consistency of the legal approach across matters. While attorneys at many companies have moved out of the legal department into managing functional departments and becoming senior executives, attorneys actually practicing law typically remain in the legal department.

2. The Assistant General Counsel assigned to Aqua NJ does not have a full scope of legal responsibility and is not an integral member of the Aqua NJ management team.

In addition to not covering regulatory and labor relations legal issues, the Assistant General Counsel assigned to Aqua NJ does not engage regulatory and legislative

attorneys and consultants and is not required by policy to be, but typically is, involved in the engagement and management of outside counsel for litigation, environmental, and acquisitions matters. Litigation matters are typically insured and counsel is provided by the terms of the insurance policy. The Assistant General Counsel also does not attend Aqua NJ management meetings.

Aqua NJ, while a relatively small state operating company for Aqua America, is still a fully functioning investor owned utility with complex legal and regulatory challenges. It would benefit from a legal perspective on its challenging management issues. While the assigned attorney is on-call, that is a different relationship than being an integral member of the management team.

Also, the legal advice responsibilities for Aqua NJ are distributed among the Legal Department, Regulatory Department, Human Resources Department, and the several outside counsels and legislative consultants engaged by Aqua NJ. Aqua NJ would benefit from an attorney acting as a "general counsel" working with the Aqua NJ management team on complex issues.

RECOMMENDATIONS

1. **Consider reassigning the regulatory counsels to the General Counsel's office. (See Finding 1)**

It is more typical for all practicing attorneys to report to the General Counsel to insure consistency of approach across all legal matters. Just as the current Assistant General Counsels support individual operating companies and corporate functions as assigned, the other three practicing attorneys could continue to support the operating companies and corporate functions as assigned. However, the potential for confusion and inconsistent policies would be reduced.

2. **Increase the scope of the attorney assigned to Aqua NJ to cover all legal and risk related matters. (See Finding 2)**

Redefine the Assistant General Counsel assigned to Aqua NJ to be a "general counsel" to Aqua NJ and an integral part of the Aqua NJ management team, similar to the Aqua NJ Controller's role but not a full-time assignment. The Aqua NJ attorney should become an integral part of the Aqua NJ management team attending meetings by teleconference or in person and being involved in all Aqua NJ legal matters, including regulatory, legislative, and labor relations, at least as a point of contact.

Further, the Aqua NJ Controller currently serves as the Assistant Secretary for Aqua NJ. It may be more consistent to have the Assistant General Counsel serve as the Aqua NJ Assistant Secretary just as the General Counsel and Secretary serves as the Aqua NJ Secretary.

G. ENTERPRISE RISK MANAGEMENT

INSURANCE AND CLAIMS

Insurance

The General Counsel is an individual contributor in personally managing Aqua America's insurance coverage. Aqua America uses an insurance broker to place its insurance. It changed to a new broker in 2017.

Aqua America has a $250,000 deductible for each claim with no cumulative maximum per year. The primary insurance carrier covers amounts from $250,000 to $1,000,000 per claim and there is a tower of coverage with additional insurance carriers for amounts over $1,000,000 per claim up to $112 million. The total annual premiums are $2.8 million.

Claims

Property Claims. For property claims against Aqua NJ, claims up to $2,500 are handled locally by Aqua NJ personnel. For claims from $2,500 to $10,000, the Aqua Services Claims Administrator handles them. A retired paralegal is also working part time on insurance claim issues. Claims over $10,000 are handled by the insurance company and are coordinated by the Assistant General Counsel assigned to Aqua NJ.

A reserve fund for paying claims is funded by charges to the several companies, including Aqua NJ. Actual payments are paid from the fund. Aqua America has "first dollar" authority for all claim settlements. The Legal Department, in conjunction with Aqua NJ, considers and agrees to all claim settlements.

There is a current major claim against Aqua NJ. An Aqua NJ vehicle and a motorcycle collided in a left-hand turn situation. The Aqua NJ driver was cited. The motorcyclist's injuries were extensive. Aqua America's insurance company engaged a New Jersey defense law firm in consultation with Aqua America.

There are also sinkhole claims against Aqua NJ from time to time by towns and municipalities, such as Phillipsburg.

Motor Vehicle Accidents. For motor vehicle accidents in all states, the employee calls the Aqua America vehicle accident contract administrator to report the accident. The administrator sends a report to the Legal Department Paralegal who sends the report on to the employee's supervisor to assure the report is accurate. The Paralegal keeps statistics and reports on motor vehicle accidents in all states.

Aqua America is self-insured for the company owned vehicle portion of motor vehicle damage. The Fleet Department specifies how the damage repair or vehicle replacement will be handled and the state organization, such as Aqua NJ, gets it done and pays for the repair.

For vehicle third-party claims less than $10,000 and with no bodily injury, the contract administrator attempts to settle the claim in conjunction with the Aqua America state organization. The contract administrator handles the interactions with the claimant. An appraisal is done if necessary and a settlement offer is made. After negotiation, the claimant may choose to litigate, in which case an outside counsel is engaged, normally

from a list of approved outside counsels developed by the Legal Department and the insurance carrier. For Aqua NJ, the Assistant General Counsel for New Jersey is involved in selecting the attorney and overseeing the litigation in concert with the Aqua NJ organization.

For motor vehicle accident claims over $10,000 or with bodily injuries, the insurance carrier is also notified at the outset. The rest of the process is the same as for less than $10,000 claims.

Aqua NJ Claims. The number of claims against Aqua NJ and the amount paid against the claim for the past five years are shown on the following table.

Aqua NJ Claims 2012–2016

Description	2012	2013	2014	2015	2016	Total	Average
Number of Claims	1	12	16	17	14	60	12
Number of Claims Paid	1	9	12	12	9	43	8.6
Percent of Claims Paid (%)	100	75	75	71	64	72	72
Amount Paid ($)	2,632	43,752	47,590	92,533	48,139	234,646	46,929
Average Cost per Paid Claim ($)	2,632	4,861	3,966	7,711	5,349	5,457	5,457

Typical claims are for water leak damage, water pressure damage, minor vehicle accidents, dig-ins, sink holes, and trip and fall injuries. Both the number and size of claims against Aqua NJ are typical for a distribution-type utility. There were no other claims against Aqua America entities relevant to Aqua NJ during the 2012 to 2016 period.

ENTERPRISE RISK MANAGEMENT PROGRAM

Aqua America is in the process of developing an enterprise risk management (ERM) program which it began in 2017. Previously, Aqua America managed risk with a combination of insurance and financial derivative products. The goal of the ERM program is to better understand and manage significant areas of risk and improve Aqua America's ability to manage risks effectively. The purpose of the ERM program is to support the organization's priorities by managing and mitigating enterprise level risks to achieving objectives, to support wider risk management initiatives across the organization, and to foster a risk aware culture.

The ERM program development is being led by the General Counsel. The General Counsel, along with an Assistant General Counsel, is responsible for developing, implementing, and operating the Enterprise Risk Management and insurance program. The ERM program reports to the Aqua America Risk Committee and the Board of Directors Risk Mitigation and Investment Policy Committee. The Aqua America Risk Committee is composed of the General Counsel, the Assistant General Counsel working on the ERM, the Director of Internal Audit, the Manager of Internal Audit, the Senior Vice President and Chief Accounting Officer, and, unofficially, the Aqua Ohio Chief Operating Officer.

The development of the ERM program has included the following steps:

- Identification of 27 risks. Risks were categorized by:
  - Risk Name
  - Underlying Vulnerabilities
  - Triggers
  - Consequences
  - Current Controls
  - Category (Operational, Legal/Regulatory, Information Technology, Political/Social, Human Capital, Strategic, and Hazard/Disaster)
- Ranking of the identified risks and selection of 13 risks for ERM program treatment. Risks were rated according to likelihood (1–5) and impact (1–5). The product of the two is the general risk score (GRS) which was used for ranking the 27 identified risks and selecting the 13 risks for inclusion in the ERM program.
- Root cause analysis to identify the earliest point at which action can be taken to reduce the chance of the risk occurring
- Assignment of individual responsibility for risk management and mitigation of each selected risk
- Development of risk mitigation programs for each selected risk
- Improvement Plans developed for each of the 13 risks:
  - Risk Owner
  - Underlying Vulnerabilities
  - Trigger
  - Consequences
  - Current Controls
  - Category
  - Current and Target Impact and Likelihood and GRS
  - Action
  - Measure of Success
  - Allocated to (individual)
  - Delivery
  - Comments
- Development of an ERM “dashboard” for tracking the status of the selected 13 risks
- Monitoring and measuring the program to ensure it is achieving the desired outcomes

The ERM was expected to be largely operational by the end of 2017 and functioning without the assistance of the consultant.

FINDINGS

1. **Aqua America is a long-established large company and its Enterprise Risk Management program development is late in being developed.**

Aqua America's roots go back to 1886 when a group of Swarthmore College professors were granted a charter to supply water to Springfield Township. Aqua America's predecessor companies have been traded on the New York Stock Exchange since 1971. Aqua America serves one million customers in eight states.

While Aqua America has been a large company for a long time, it only recently developed an Enterprise Risk Management program. ERM is a well-developed concept operational at many large utilities. Aqua America should have developed and implemented an ERM program earlier.

2. **The ongoing operation of the ERM program development and operation is under-resourced.**

Aqua America has no Risk Management or Insurance Department. The insurance program and the ERM program are handled as ancillary duties by the General Counsel and an Assistant General Counsel. It is anticipated that the Assistant General Counsel will evolve into the Risk Manager and will eventually supervise the claims and insurance functions but will retain all of his other duties, including serving as the principal attorney for Aqua NJ.

The ERM Assistant General Counsel has not received any risk management development or training other than working with the risk management consultant and attending one or two informal Philadelphia area risk manager group meetings.

Risk and insurance management is a well-developed professional specialty. Between the SEC Form 10-K risk disclosures and the ERM program, Aqua America has identified dozens of serious risks, most of which potentially affect Aqua NJ. It would be preferable for Aqua America to have a professional risk manager to continue to develop and operate the ERM and insurance programs.

3. **The risks disclosed in the Aqua America SEC Form 10-K are not entirely consistent with the risks identified in the development of the ERM program.**

The Aqua America 2016 Securities and Exchange Commission Form 10-K report lists multiple risk factors:

- Contamination of water supplies
- Failure to obtain rate increases
- Inadequate access to funds for capital expenditures
- Inability to comply with debt covenants
- Problems resulting from future acquisitions of water and wastewater utility systems
- Competition for future water and wastewater utility system acquisitions from other regulated utilities, government entities, and strategic and financial buyers
- Terrorist attacks

- Dam or reservoir failures, major repairs or upgrades, or requirements to dismantle
- Water treatment plant or transmission and distribution system failures
- Wastewater collection system or treatment plant failures
- Cyber security failures
- Droughts and government imposed water use restrictions
- Reduced residential customer water consumption as a result of water conservation efforts
- Dispositions of operations in areas of limited growth opportunities or unsatisfactory financial returns
- Operational concentration in Pennsylvania
- A general economic downturn
- Condemnations or other takings by government entities of water and wastewater systems
- Actual income tax liability materially higher than the income tax provision
- Higher compliance costs from new federal and state environmental laws and regulations
- Increased regulation of fracking could harm the joint venture raw water pipeline business
- Wastewater spills or incompletely treated discharges
- Work stoppages or other labor relations matters
- Shortages of materials or contract services
- Management attrition
- Costs of compliance with current and proposed climate change laws and regulations
- Increased weather volatility due to climate change

The 27 risks identified in the ERM program are confidential but do not include several of these SEC reported risks and several of the ERM identified risks are not included in the SEC reported risks.

RECOMMENDATIONS

1. Hire or develop an ERM professional to direct the program. (See Findings 1 and 2)

Enterprise risk management is a well-developed profession and the scale of risks facing Aqua America warrant the employment of a professional risk and insurance manager. The current Assistant General Counsel involved in the ERM could likely develop into a professional risk and insurance manager if he had fewer other duties and had a well-conceived developmental program. Alternatively, an experienced professional risk manager could be recruited. Without a professional risk manager, Aqua America and Aqua NJ may be overly reliant on consultants and insurance brokers and more vulnerable to adverse consequences from risks.

2. Reconcile the ERM developed risks and the risks disclosed in the SEC Form 10-K. (See Finding 3)

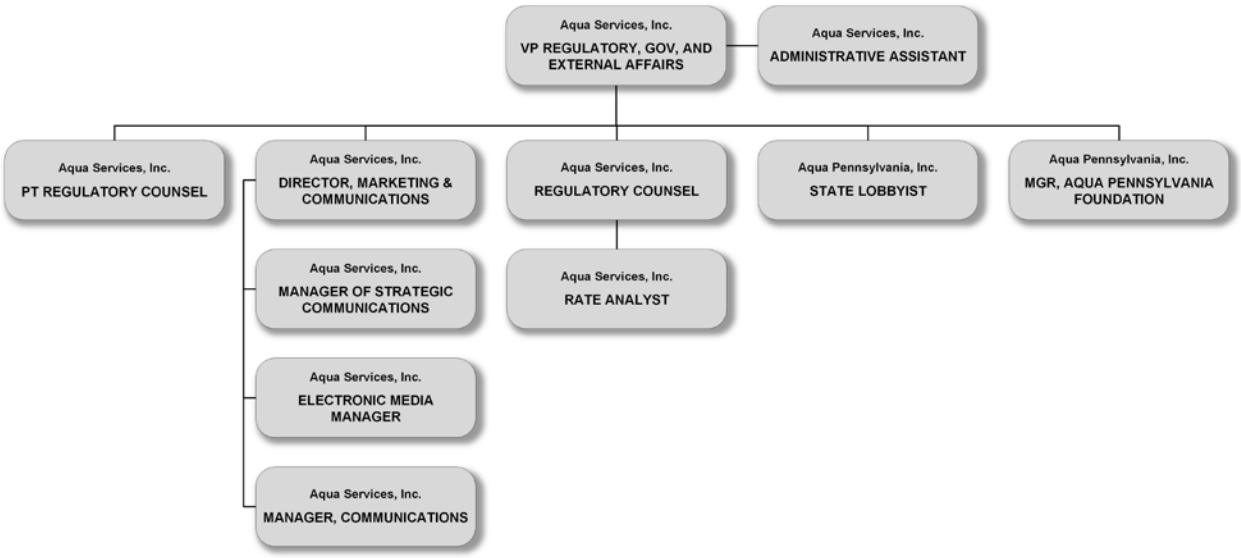
The risks reported in the SEC Form 10-K are intended to be comprehensive. While the ERM prioritizes 13 risks for formal mitigation management, they should all be reflected in the SEC Form 10-K. Further, the ERM should catalog all of the ERM and SEC Form 10-K identified risks for annual review and reevaluation along with the identification of emerging risks. As the ERM program develops, it can accommodate additional risks for formal mitigation and some prior identified and emerging risks may be candidates for formal ERM treatment.

H. EXTERNAL RELATIONS

BACKGROUND

The Vice President, Regulatory, Government, and External Affairs' organization is shown in the following exhibit.

Regulatory, Government, and External Affairs Organization Structure



The Vice President, Regulatory, Government, and External Affairs group has evolved over time. The incumbent joined Aqua in 2007 as the Assistant Regulatory Counsel and became the Regulatory Counsel in 2008 working in the Chief Financial Officer's organization. In 2012, the Legislative Affairs function was added to the Regulatory Counsel's responsibilities. In 2015, the Regulatory Counsel group was separated from the Chief Financial Officer's group, the Regulatory Counsel was promoted to Vice President, and the Communications, Foundation, and political action committee functions were added to the Regulatory Counsel's group. At the beginning of 2016, the Marketing and Communications unit was added to the Regulatory Counsel's group. At present, this group includes:

- A part-time Regulatory Counsel who handles Pennsylvania formal complaints
- A Director of Marketing and Communications who supervises two Communications managers, one for New Jersey, Illinois, and North Carolina, and

one for Texas, Virginia, Human Resources, and Information Technology (Please see Chapter IV, Finance and Accounting, for more information on this function)

- A Regulatory Counsel who assists with all regulatory cases, including New Jersey. The Regulatory Counsel is assisted by a Rate Analyst
- An Aqua Pennsylvania state lobbyist
- An Aqua Pennsylvania employee who manages the Aqua Pennsylvania Foundation

The Vice President is also an individual contributor who personally manages all regulatory proceedings, including Aqua NJ's.

The Electronic Media position manages the "Infostream" intranet which includes a library of some, but not all, policies, procedures, and standards from the Human Resources, Information Technology, and other departments. The position also manages the single Aqua America website with pages for each state company. The position also manages the Aqua monitoring of and participation in the social media sites of Facebook, Twitter, and LinkedIn. The Customer Operations group responds to customers as needed.

One of the two Managers of Communications is assigned to assist the President of Aqua NJ with his communication needs. This can include writing press releases and statements and ghost writing presentations. All New Jersey print and electronic media calls are referred to this position. All community relations related to acquisitions and rate case messaging are also facilitated by this position.

Aqua NJ engages a contract lobbyist for New Jersey who has a dotted line relationship to the Vice President.

The Vice President is the Aqua liaison to industry regulatory groups including National Association of Regulatory Utility Commissioners, the National Association of Water Companies (the eight investor owned water companies and some contract operators) (NAWC), the New Jersey chapter of NAWC, the New Jersey Utility Association, and regional associations.

Aqua America engages outside counsel for all state regulatory matters including for Aqua NJ. Additionally, expert witnesses are engaged as needed, such as a rate of return expert and a rate design and billing analyst for New Jersey proceedings.

Aqua America also engages a Public Relations firm, a graphic design firm, and a social media firm.

III. SYSTEM OPERATIONS

This chapter covers the Aqua New Jersey, Inc. (Aqua NJ) water and wastewater system operations in several sections:

A. Overview
B. Aqua NJ Organization
C. Aqua Services Regulated Operations
D. Performance
E. Practices and Processes
F. System Planning, Facilities, and Land Management
G. Capital Program
H. System Acquisitions
I. Procurement, Materials Management, and Transportation
J. Operational Security

A. OVERVIEW

Aqua NJ is a subsidiary of Aqua America Inc. (Aqua America). Aqua NJ was organized in the State of New Jersey in July 2003 and is regulated by the New Jersey Board of Public Utilities (NJBPU).

FORMATION

The predecessor to Aqua NJ was created through the merger of the Peoples Water Company of Phillipsburg, the Hamilton Square Water Company, and the Blackwood Water Company with water companies previously owned by Consumers Water Company (Consumers) of Portland, Maine to create the Garden State Water Company in 1969 as a subsidiary of Consumers. In 1995, after having acquired several other local water companies, Garden State changed its name to Consumers New Jersey Water Company (CNJ).

In 1999, the Woolwich Water Company and Woolwich Sewer Company were purchased and merged into CNJ. In March 1999, CNJ's parent company, Consumers Water Company, was acquired by Philadelphia Suburban Corporation (PSC). In January 2004, PSC changed its name to Aqua America, Inc. and changed the name of CNJ to Aqua NJ.

SERVICE TERRITORY

Aqua NJ's corporate offices are located in Hamilton Township, Mercer County, New Jersey. The utility is organized into four geographic Divisions with operations in the following counties:

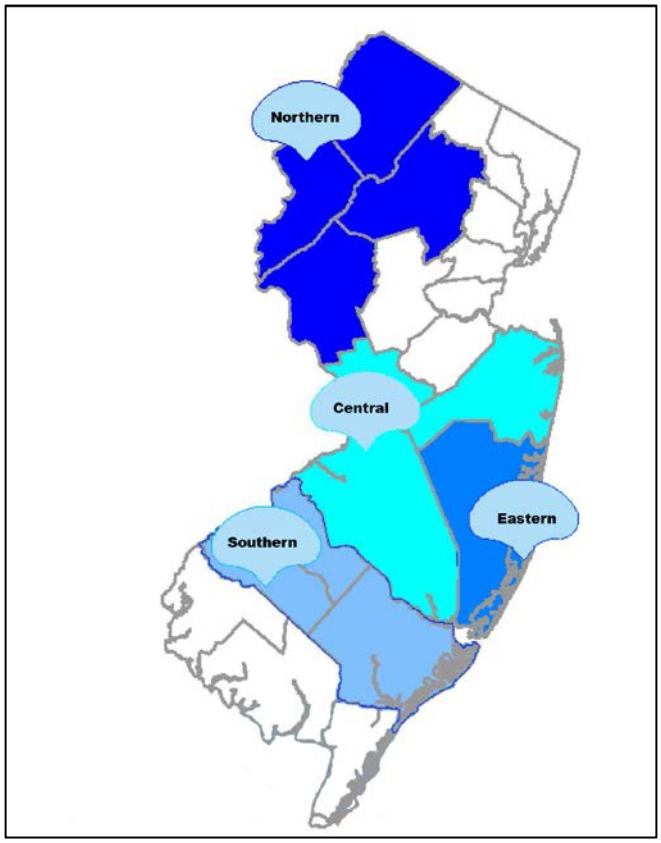
- Northern Division
  - Warren County
  - Hunterdon County
  - Sussex County

- Morris County

- Central Division
  - Burlington County
  - Mercer County
  - Monmouth County
- Southern Division
  - Atlantic County
  - Camden County
- Eastern Division
  - Ocean County

Aqua NJ's service territory is shown in the following exhibit.

Aqua New Jersey Service Territory



Aqua NJ provides water and wastewater service to 52,000 customers in 30 municipalities across New Jersey. There are 25 separate water systems and 10 separate wastewater systems.

Aqua NJ water delivered to customers and collected and treated wastewater effluent must meet rigorous federal and state regulations and standards as monitored and enforced by the New Jersey Department of Environmental Protection (NJDEP). Water and wastewater systems must be permitted and Aqua NJ must meet the terms of the permits or be held in violation.

WATER SYSTEMS

Aqua NJ water systems generally consist of one or more wells; water treatment plants; water storage reservoirs; standpipes and elevated storage tanks; pumps to transfer water up to the reservoirs, standpipes, and tanks or for distribution system pressurization; and a distribution system of mains and services to deliver water to customers. All water connections are individually metered. Aqua NJ water treatment typically involves pH control and chlorination, although six radium removal treatment facilities have been installed (four in the Central Division and two in the Southern Division) and three treatment facilities include an ultraviolet light disinfection treatment system. All systems are monitored by Supervisory Control and Data Acquisition (SCADA) systems monitored at Division headquarters.

The following table provides a summary characterization of Aqua NJ's water systems.

Aqua NJ System Characterization
Water Systems

System Name	Division	Date Acquired	Number of Connections	2016 Gallons Sold (Million Gallons)	SCADA
Bear Brook	Northern	7/2/2004	80	8.60	Yes
Brainards	Northern	12/11/2002	52	1.80	Yes
Bunnvale	Northern	1/23/2002	99	4.22	No
Byram	Northern	6/2/2016	153	2.46	No
Califon	Northern	7/12/1989	596	20.90	Yes
Cliffside Park	Northern	10/3/2016	34	0	Yes
Fox Hill	Northern	Not Disclosed	69	1.89	Yes
Harkers Hollow	Northern	11/30/2009	17	0.85	Yes
Phillipsburg	Northern	1969	10,312	832.14	Yes
Riegelsville	Northern	11/21/1974	25	1.34	Yes
Riegel Ridge	Northern	11/21/1974	239	15.335	Yes
Summit Lake	Northern	8/1/2014	76	2.06	Yes
Tranquility	Northern	10/25/2012	46	4.15	Yes
Vernon	Northern	11/23/2010	206	10.06	Yes
Wallkill Water & Sewer	Northern	12/17/2012	389	27.61	Yes
Warren Glen	Northern	Not Disclosed	73	3.24	Yes
Berkeley Eastern	Central	11/22/2005	4,230	263.52	Yes
California Village	Central	12/11/2006	140	3.40	Yes
Hamilton	Central	Incorporated 1919	12,738	1343.99	Yes
Lawrenceville	Central	10/3/2008	2,665	186.05	Yes
North Hanover	Central	1/13/2003	145	4.33	Yes
Spartan Village	Central	10/2014	214	7.62	Yes
Blackwood	Southern	Incorporated 1906	15,372	1,286.56	Yes
Seaview Harbor	Southern	4/16/2015	89	6.46	Yes
Woolwich	Southern	8/20/1998	1,669	199.36	Yes

Most Aqua NJ water is produced from Aqua NJ wells but there are contracts to purchase treated water from other water utilities. The most noteworthy of these is the contract with Trenton Water Works (TWW) entered into in June 2010, by which Aqua NJ is entitled to receive from TWW up to three million gallons of potable water per day. Under a separate agreement, TWW is entitled to receive as much potable water from Aqua NJ as possible under peak or emergency conditions while still meeting its commitments to its own customers. Aqua NJ also has two contracts with New Jersey

American Water to provide, on a combined basis, 0.690 million gallons per day, 15.39 million gallons per month, and 251.85 million gallons per year delivered to three different Aqua NJ points of delivery. Aqua NJ also purchased 2.40 million gallons from Riegelsville Water Company in 2016.

WASTEWATER SYSTEMS

Aqua NJ wastewater systems generally consist of a service line for each wastewater connection to a collection system of sanitary sewers that carry the wastewater to a wastewater treatment plant. Lift stations are utilized where gravity feed is not practical. Wastewater connections are not metered but are billed based on water consumption.

The following table provides a summary characterization of Aqua NJ's wastewater systems.

Aqua NJ System Characterization
Wastewater Systems

System Name	Division	Date Acquired	Number of Connections	2016 Gallons Processed (Million Gallons)	SCADA
Bear Brook	Northern	1/25/2005	86	5.11	Yes
Stanton Ridge	Northern	12/15/2006	152	11.68	Yes
Oakwood Village	Northern	1/1/2017	NA	NA	No
Wallkill Sewer	Northern	12/17/2012	389	0.73	No
California Village	Central	12/11/2006	140	3.33	No
Hanover Village	Central	1/13/2003	145	4.41	No
Spartan Village	Central	10/9/2014	214	7.83	No
Robert Frost	Central	Built 1967	NA	52.73	Yes
Maxim	Central	5/20/2003	2,572	231.41	No
Woolwich Lift Sta.	Southern	8/20/1998	2,392	68.99	Yes

FINDING

1. Six of Aqua NJ's wastewater systems do not have SCADA monitoring.

Unlike Aqua NJ water systems, which all have SCADA systems monitoring, six of the ten wastewater systems do not have SCADA systems monitoring capabilities.

RECOMMENDATION

1. Aqua NJ should install SCADA monitoring systems on its wastewater facilities that do not have them. (See Finding 1)

Fitting all wastewater facilities with SCADA systems would provide enhanced monitoring and control capabilities for Aqua NJ's wastewater operations.

B. AQUA NJ ORGANIZATION

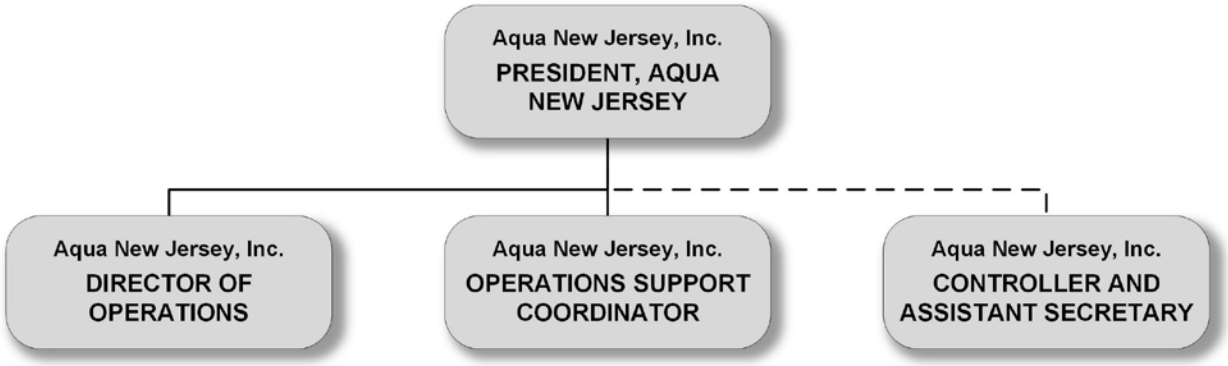
Aqua NJ is led by the President, Aqua NJ, who reports directly to the Aqua Services Deputy Chief Operating Officer (DCOO). The Aqua NJ President is one of eight state Presidents within the Aqua America structure who lead operating organizations in Pennsylvania, Ohio, North Carolina, Illinois, Texas, New Jersey, Indiana, and Virginia. The President's reporting relationship with the DCOO began in February 2018; previously the position reported to the Aqua Services Chief Operating Officer.

The Aqua NJ President is responsible for regulatory, legislative, association, (New Jersey Utilities Association of investor owned utilities), and community relationships in New Jersey. Since there is presently no business development representative in New Jersey, he also serves as the principal business development representative in identifying and developing water and wastewater system acquisition opportunities. Approximately half of the President's time is spent on external activities.

The Aqua NJ President has multiple interfaces with Aqua Services functions, including Finance and Accounting, Business Development, Information Technology, Government and Regulatory Affairs, Legal, and Human Resources.

The Aqua NJ President has two direct reports and one indirect report, as shown in the following exhibit.

Aqua NJ Organization Structure



In total, the Aqua NJ organization has 49 positions authorized, not including the President. Two positions were vacant during the onsite portion of the audit, a Part Time Seasonal Laborer in the Central Division and a Utility Field Service Worker I in the Southern Division.

OPERATIONS SUPPORT

The Operations Support Coordinator provides liaison between the Aqua Services Customer Call Centers and the Aqua NJ customer field service operations in the Divisions. The position has no subordinates. The position also administers meter information within the Aqua NJ Divisions, including tracking reused and scrapped meters.

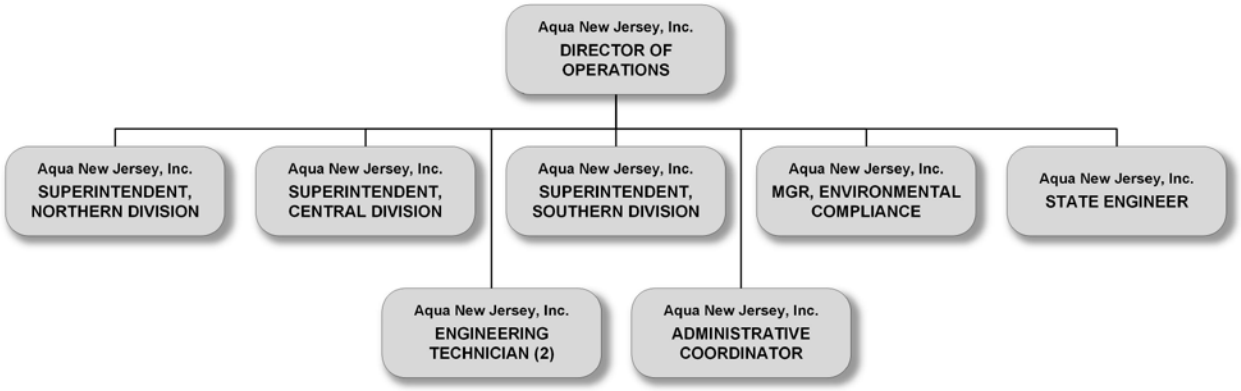
AQUA NJ CONTROLLER

Aqua NJ receives accounting, financial, and regulatory management support from the Aqua NJ Controller. This position is not in the Aqua NJ organization per se, but reports directly to the Regional Controller for Pennsylvania and New Jersey, an Aqua Pennsylvania employee, within the Aqua Services organization. The Aqua NJ Controller is an Aqua NJ employee and has a dotted line reporting relationship with the Aqua NJ President. The Controller is collocated with the President at the Hamilton, NJ headquarters. Please see Chapter VI, Finance and Accounting, for more information on this position.

AQUA NJ OPERATIONS

The following exhibit shows the organization structure for Aqua NJ Operations.

Aqua NJ Operations Organization Structure



The Director of Operations has eight direct reports: the Superintendent, Northern Division; Superintendent, Central Division; Superintendent, Southern Division; Manager, Environmental Compliance; State Engineer; two Engineering Technicians; and an Administrative Coordinator.

The Division Superintendents are responsible for operations and maintenance of the water and wastewater systems, customer field service, community and local government relationships, and management of the on-call contractor. They do not manage the capital program in their Divisions, other than minor main, service, valve, and hydrant additions and replacements made by the on-call contractor. The Aqua NJ Division personnel do not perform heavy field work and have no heavy excavation, trenching, or material hauling equipment. All field work requiring heavy equipment or crews, such as main break repairs and hydrant replacements, is performed by the on-call contractor.

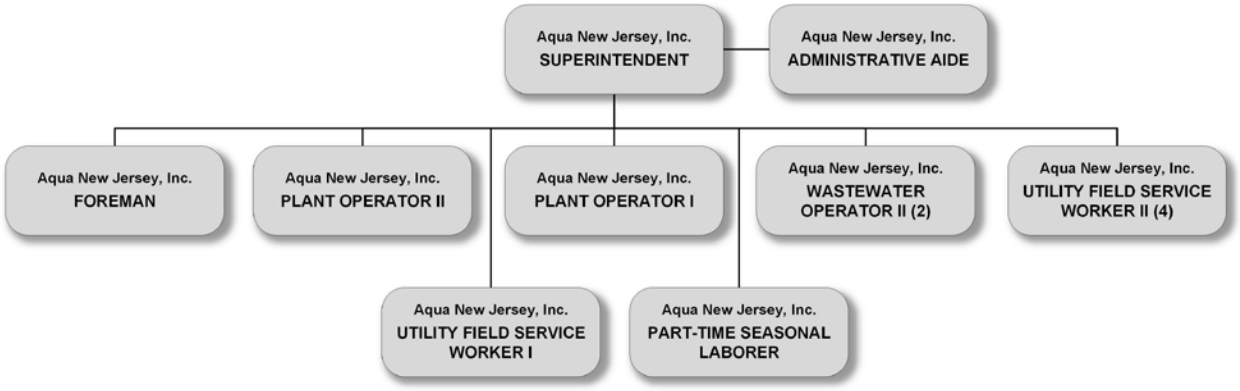
The Aqua NJ Director of Operations also has a dotted line relationship with the Aqua Services Deputy Chief Operating Officer who coordinates activities among all of the state Directors of Operations on topics such as lost water and other performance issues.

These positions and their organizations are described below.

Northern Division

The following exhibit shows the organization structure for the Northern Division.

Aqua NJ Northern Division Organization Structure



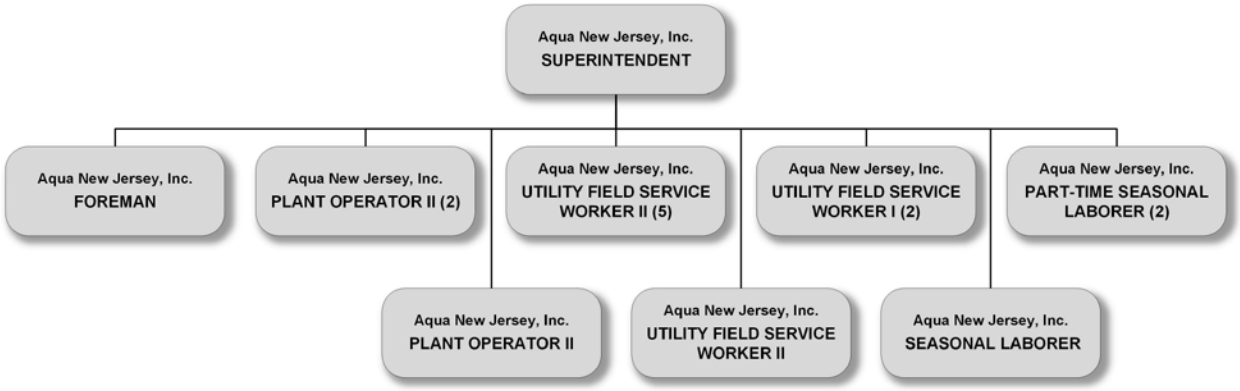
The Superintendent of the Northern Division has one Foreman, one Plant Operator II, one Plant Operator I, two Wastewater Operator II, four Utility Field Service Worker IIs, one Utility Field Service Worker I, one Part Time Seasonal Laborer, and one Administrative Aide positions reporting. The Part Time Seasonal Laborer position is filled during the summer months.

In addition to his duties as Superintendent, the incumbent is assigned a collateral duty as the Aqua NJ Safety Coordinator. In this role he coordinates safety training for Aqua NJ and works with the Aqua Services Safety Director. The Superintendent volunteered for this assignment.

Central Division

The following exhibit shows the organization structure for the Central Division.

Aqua NJ Central Division Organization Structure



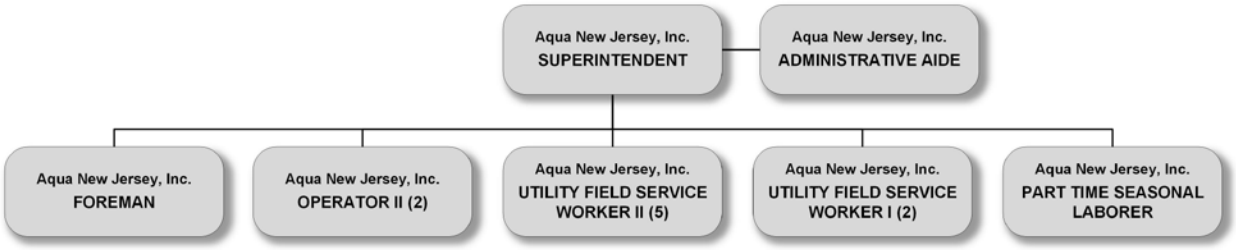
The Superintendent of the Central Division and Eastern Division has one Foreman, two Plant Operator IIs, five Utility Field Service Worker II's, two Utility Field Service Worker Is, and two vacant Part Time Seasonal Laborer positions reporting to him in the Central Division. In addition to his Central Division responsibilities, the Superintendent also

manages the Eastern Division which consists of parts of Ocean and Atlantic Counties. For the Eastern Division, the Superintendent has an Operator II, a Utility Field Service Worker II, and a Seasonal Laborer reporting to him. Other than the vacant Part Time Seasonal Laborer position at Hamilton, the Division is fully staffed.

Southern Division

The following exhibit shows the organization structure for the Southern Division.

Aqua NJ Southern Division Organization Structure



The Superintendent of the Southern Division has one Foreman, two Operator IIs, five Utility Field Service Worker IIs, two Utility Field Service Worker Is, one Part Time Seasonal Laborer, and one Administrative Aide position reporting to him. The Seasonal Laborer position is presently filled and the Division is fully staffed.

Environmental Compliance

The Aqua NJ Manager, Environmental Compliance, is an individual contributor with no subordinates. The position is responsible for all Aqua NJ water and wastewater compliance activities (both State and Federal), water sampling, reporting, monitoring production data, and responding to the New Jersey Department of Environmental Protection (NJDEP) inquiries and customer inquiries. Examples of inquiries include questions about water fluoridation, water hardness, and water quality. The Manager is assisted in these responsibilities by the Aqua Services Environmental Affairs Group which is led by the Vice President/Chief Environmental Affairs Officer (VP/CEAO) and the Director, Environmental Compliance.

The Manager's primary points of contact are the Aqua NJ Division Superintendents and the Operations Director. There is some interface with the Finance organization and with the Aqua Services Director, Environmental Compliance that is generally related to water operations standard operating procedures, and seeking advice for reporting and handling various compliance situations.

The Manager prepares various water quality reports (i.e., lead and copper content) and transmits them to the Director of Environmental Compliance. This input is utilized in developing the Consumer Confidence Reports that are annually distributed to Aqua NJ customers with their bills. These reports are also known as the drinking water quality reports. The Manager is also responsible for compliance reporting to the NJDEP for both water and wastewater. This reporting covers compliance for the 25 water treatment plants and five wastewater treatment plants.

Engineering

The Aqua NJ State Engineer is responsible for oversight of the planning, engineering, and implementation of the Aqua NJ capital plan and engages multiple contractors to accomplish these responsibilities. Most technical design work and all construction work are performed by contractors. Specialized studies for unique needs are also done by contractors, such as developing water treatment processes to meet challenging regulatory requirements.

The State Engineer oversees the execution of Aqua NJ's capital program. The capital program expenditures totaled over $77 million in the past five years and have averaged $15.5 million per year during that period. An important element of the Aqua NJ capital program is the Distribution System Improvement Charge (DSIC) program. This program, which is reviewed by the NJBPU, permits Aqua NJ to apply a five percent water rate rider surcharge if it meets the NJBPU DSIC requirements with its water main, hydrant, and service replacement program.

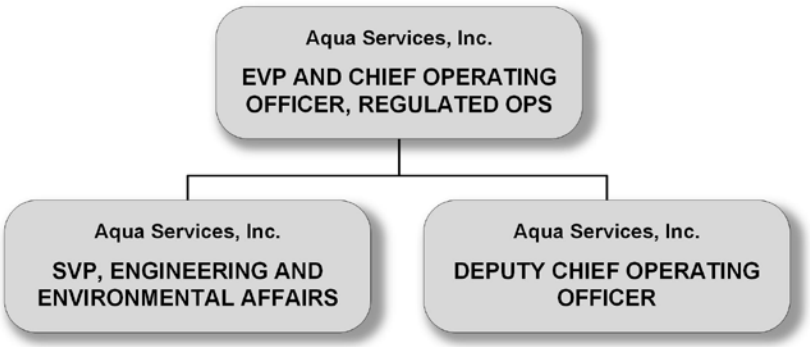
Although the State Engineer position has no direct reports, there is a close interface with the two Aqua NJ Engineering Technicians. Additionally, the Aqua NJ Engineer has a dotted line reporting relationship with the Director of Corporate Engineering in the Aqua Services organization and works closely with the Aqua Services engineering management and support personnel on the capital program, plant engineering designs, Computer Aided Design (CAD), Geographical Information Systems (GIS), hydraulics modeling, and Supervisory Control and Data Acquisition (SCADA) systems.

The two Engineering Technician positions report to the Operations Director and are primarily engaged in automated CAD and GIS applications for some water distribution and wastewater collection projects.

C. AQUA SERVICES REGULATED OPERATIONS

Several organizations within the Aqua Services Regulated Operations group provide direct support to Aqua NJ's system operations, as described below. The Executive Vice President and Chief Operating Officer (COO), Regulated Operations, leads this group and has multiple direct reports including several state presidents as well as the Senior Vice President for Engineering and Environmental Affairs and the Deputy Chief Operating Officer who provide support to Aqua NJ's operations. The following organization chart shows the COO's direct reports who support Aqua NJ's operations.

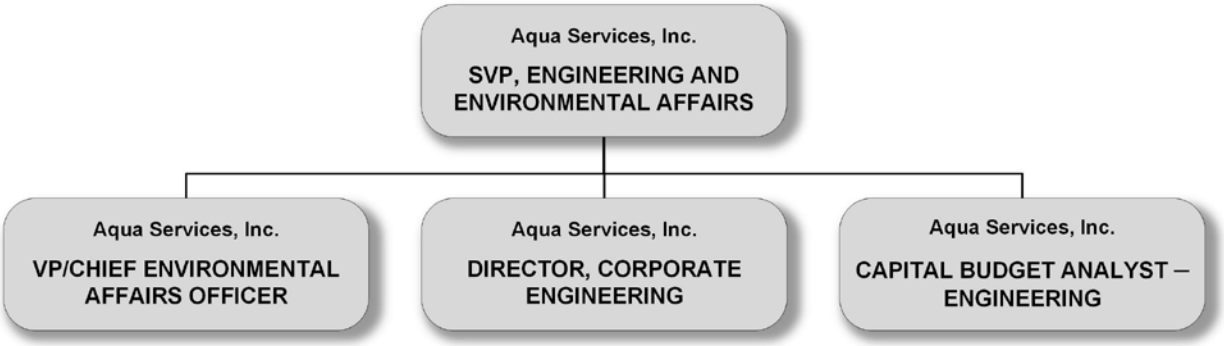
Aqua Services Regulated Operations Organization Structure



ENGINEERING AND ENVIRONMENTAL AFFAIRS

The Senior Vice President for Engineering and Environmental Affairs reports directly to the COO and is responsible for all Aqua America corporate engineering and environmental compliance activities. The position has four direct reports that include the Director, Corporate Engineering, Vice President/Chief Environmental Affairs Officer, and a Capital Budget Analyst. The fourth report is the Director, Pennsylvania Engineering. The SVP is also involved in coordination activities with all state Operations Managers, Engineers, and Compliance Coordinators. The following organization chart shows the SVP's direct reports who support Aqua NJ's operations.

Aqua Services Engineering and Environmental Affairs Organization Structure

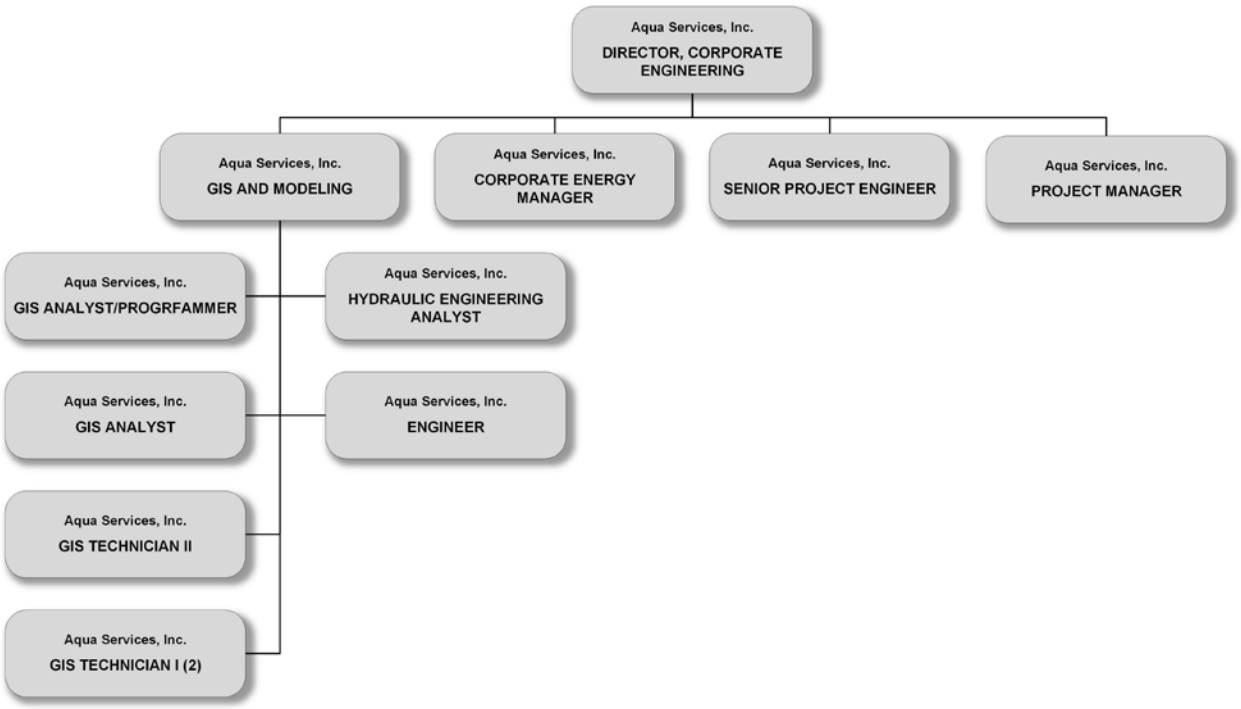


The incumbent SVP retired in February, 2018 and the COO has restructured the organization such that the SVP position will be eliminated and the Director, Corporate Engineering and the Vice President/Chief Environmental Affairs Officer will become direct reports to the COO. The Capital Budget Analyst will report to the Director, Corporate Engineering.

Corporate Engineering

The Director, Corporate Engineering, provides specialized services to Aqua NJ and the other state operations including the standardized capital budgeting process, GIS support, hydraulic modeling of water systems, and major project management (such as for the SCADA security initiative). The Director was promoted to his current role approximately a year ago. His previous assignment was as the State Engineer for Aqua NJ, a role he held for several years. Thus, he has a good understanding of the Aqua NJ system, condition, and needs. The Director, Corporate Engineering has four direct reports as shown on the organization chart below.

Aqua Services Corporate Engineering Organization Structure



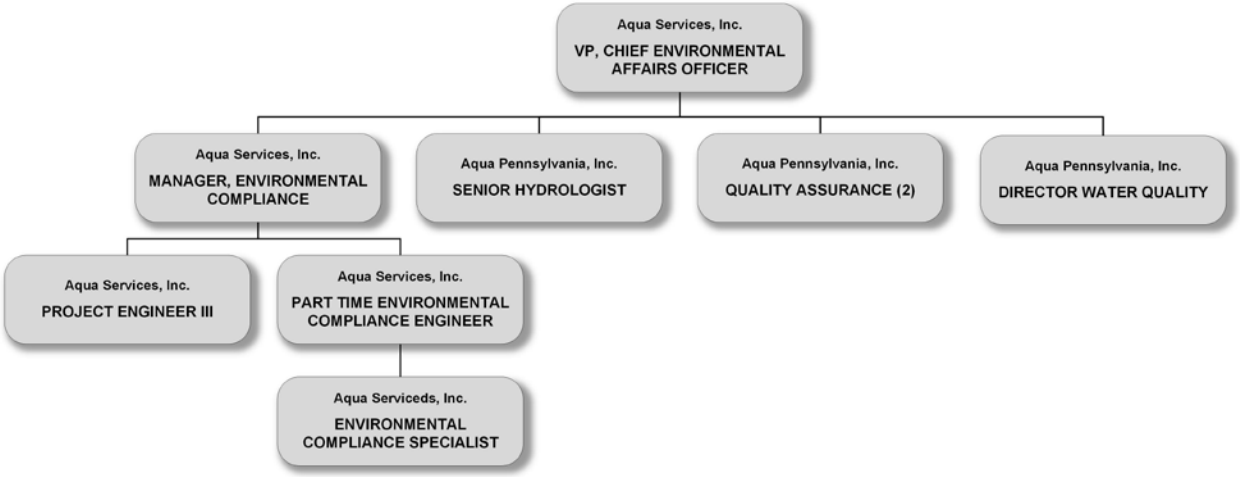
Direct reports include the Manager, GIS and Modeling; Manager, Corporate Energy; Senior Project Engineer, Wastewater; and Project Manager, Major Projects. The Manager, GIS and Modeling is responsible for providing GIS and hydraulic modeling support on a company-wide basis. The Manager, Corporate Energy is responsible for budgeting and managing energy costs and seeking cost reductions from energy providers on a company-wide basis. The Senior Project Engineer, Wastewater is responsible for providing centralized focus and consistency among Aqua America's wastewater operations. The Project Manager, Major Projects has oversight of planning, programs and projects in several states. This includes facility planning, DSIC implementation planning and cybersecurity upgrades for all Aqua states.

Environmental Affairs

The Vice President/Chief Environmental Affairs Officer (VP/CEAO) reports to the Senior Vice President for Engineering and Environmental Affairs and, effective February, 2018, will become a direct report of the COO. Responsibilities of the VP/CEAO include meeting or exceeding regulatory requirements, including compliance activities; monitoring regulatory performance; and establishing consistent policies in the eight states in which Aqua America operates.

The VP/CEAO's organization is shown in the exhibit below.

Aqua Services Environmental Affairs Organization Structure



The VP/CEAO has four subordinates, three of which are in the Aqua Pennsylvania organization. The fourth position, the Manager, Environmental Compliance is an Aqua Services employee who is responsible for water resources and environmental compliance.

The Manager, Environmental Compliance has two subordinate units. The first is the Water Resources group that is staffed by an Engineer III. This position manages treatment residual disposal activities. The second group is the Compliance group that is staffed by a part time Environmental Compliance Engineer and an Environmental Compliance Specialist. This group compiles and analyzes the internal compliance statistics for each state operating organization. The Specialist also develops the Annual Consumer Confidence Report for Aqua NJ and the other states.

The VP/CEAO also has the Aqua Pennsylvania laboratory under his purview; it provides general laboratory services to the operating companies, including Aqua NJ. Although the laboratory is in the Aqua Pennsylvania organization, it is certified by New Jersey for both water and wastewater testing. This includes analysis of bacteria, metals, organics, and disinfection by-products.

Capital Budget Analyst

The Capital Budget Analyst reports to the Senior Vice President for Engineering and Environmental Affairs and is an individual contributor. The position is responsible for generally assisting the SVP and developing capital budget summaries. This information is used to manage the “Opportunities Meetings” that are convened bi-monthly for each state to review the status of capital projects in various phases, among other agenda items. The Analyst also tracks the implementation status of the Aqua NJ Distribution System Improvement Charge (DSIC) projects that have been filed with the NJBPU as well as tracking similar information for other states.

DEPUTY CHIEF OPERATING OFFICER

The Deputy Chief Operating Officer (DCOO) is responsible for the Aqua Services centralized safety function, the asset management program, and centralized state field services. The position has two direct reports: the Manager, National Safety and the

Director, Asset Management and Field Services. The DCOO also has a dotted line relationship with the state Directors of Operations to coordinate activities on topics such as lost water and other performance issues. The DCOO's organization is shown in the exhibit below.

Aqua Services Regulated Operations – Deputy Chief Operating Officer Organization Structure

Effective in February 2018, as part of the COO's restructuring of the Regulated Operations organization, the following three state presidents began reporting to the DCOO: President, Aqua NJ; President, Aqua Virginia; and President, Aqua Indiana. The DCOO continues to maintain dotted-line relationships with the state Directors of Operations in all of the states.

The Manager, National Safety, reports directly to the DCOO. Formerly residing in the legal department, National Safety was recently moved under the DCOO to shift the overall safety focus to operations. The DCOO characterizes Operations responsibility for safety as "Operations owns safety." The State Director of Operations is responsible for compliance with Occupational Safety and Health Administration regulations, ensuring completion of job specific training, and issuing the proper equipment and tools to complete work safely.

There is no safety specialist physically located in New Jersey. Aqua NJ is served by an Aqua Pennsylvania employee Regional Safety Specialist position which is expected to spend two to four days per month in New Jersey. While that position had been vacant for approximately nine months, it has recently been filled with a start in May 2018. The position was filled on temporary basis by a contractor in October 2017.

At Aqua NJ, the Northern Division Superintendent is serving as Safety Coordinator for the state. The baseline safety training program, which includes Fall Protection, Excavation, Confined Space, Electrical Safety, and Chemical Handling, is developed by the National Program and rolled out to the individual states. Training is provided in both classroom format and videos for individuals. Completion of all required safety training is the responsibility of the individual states, including Aqua NJ.

The Director, Asset Management and Field Services, reports to the DCOO and has responsibility for the oversight of the field service activities among the eight Aqua America states and development of the asset management program among the eight states. The Director has one direct report, the National Supervisor of Field Services.

The National Supervisor of Field Services reports to the Director, Asset Management and Field Services and manages a National Operations Center (dispatch office) in the Aqua America Bryn Mawr headquarters that schedules and reschedules state field personnel, including the Aqua NJ Division workers. This position oversees the field personnel's tablet links to the customer work order system, which manages customer service orders from the national customer information system (CIS), and the maintenance work order system, which is used for preventive and repair maintenance.

FINDINGS

1. The support services provided to Aqua NJ by Aqua Services are effective.

Aqua Services provides a broad range of important services to Aqua NJ that include engineering, environmental, information technology, purchasing, transportation, and field support services that are essential to Aqua NJ's operations. These services are delivered effectively.

2. Presently, the two Engineering Technicians on the Aqua NJ staff report to the Operations Director; however, the State Engineer is more directly involved in the engineering matters of Aqua NJ than the Operations Director.

Although the two Aqua NJ Engineering Technician positions report to the Operations Director, they are primarily engaged in design and engineering activities such as CAD and GIS applications for water distribution and wastewater collection projects that are highly relevant to the State Engineer's responsibilities.

RECOMMENDATION

1. Consider realigning the reporting arrangement for the two Aqua NJ Engineering Technicians to report directly to the State Engineer instead of the Operations Director. (See Finding 2)

Direct reporting of the two Engineering Technicians to the State Engineer would establish clearer lines of communication and accountability for their work as well as more directly support the State Engineer's objectives.

D. PERFORMANCE

SCORECARD

The monthly Scorecard is the primary tracking system for operational performance for Aqua NJ and the other state operating companies. From an Aqua America perspective, the Scorecard program is overseen by the Deputy Chief Operating Officer (DCOO). Beginning in 2017, the Scorecard was modified to include new metrics, to eliminate some metrics, and for general reformatting. Additionally, the metrics classified as "track only" on previous years' scorecards have been integrated into the rest of the metrics. The Scorecard performance metrics have been grouped into five categories that include: Fiscal Responsibility, Operations Management, Customer Operations, Meter Operations, and Environmental Compliance. A standardized report format has been developed that is the same for all state organizations.

As far as Aqua NJ System Operations are concerned, the metrics that are most relevant are included in the Operations Management (17 metrics) and Environmental Compliance (five metrics) categories. Metrics are shown in these categories for each of the Aqua NJ President; the three Superintendents; the Manager, Environmental Compliance; and the Operations Support Coordinator. The DCOO plans to add the State Engineer to each respective state scorecard in 2018.

The performance data displayed on the Scorecard for each metric include the metric weight, target, actual, and the Aqua NJ score. If available, the previous year's results are shown along with an American Water Works Association (AWWA) benchmark.

The Scorecard is designed to reflect the percentage of incentive compensation allocated to the Scorecard for each of the employees. All metrics on the scorecard are reviewed and discussed. However, up to ten metrics are given "weight" by management. That weight translates into a certain number of points if the metrics are achieved. A score of 100 can translate into a maximum of 10% of the employee's bonus/short term incentive.

NON-REVENUE WATER

A related performance area is non-revenue water (NRW). Reducing the amount of non-revenue water (NRW), or lost water, is an important initiative for Aqua NJ and several activities are in place to reduce it.

Aqua NJ has an established goal of 85% metered ratio across the company. This means that 85% of all recorded send-out should be accounted for when all consumers' meters are read. Aqua NJ met that goal in 2016 with a company-wide metered ratio of 86.1%. The NJDEP has benchmarked New Jersey systems generally at 85% to 86% as metered.

Aqua NJ's company-wide percentages of NRW for the years 2012 to 2016 are shown in the table below.

Aqua NJ Percentages of Non-Revenue Water

Metric	2012	2013	2014	2015	2016
Unaccounted for Water	14.0%	17.2%	15.4%	15.0%	14.3%

As part of its effort in this regard, Aqua NJ issued a "Water Conservation Program and Water Loss Prevention Policy Manual" in 2016. This document is a compilation of Aqua NJ plans and procedures intended to guide its efforts to promote water conservation and prevent water loss. It is intended to serve as a compilation of water conservation management plans and water loss prevention activities.

The policy manual states Aqua NJ's philosophy regarding water conservation and lost water as follows:

> *ANJ should emphasize good practices to properly manage its water resources to reliably and cost-effectively meet the needs of customers while encouraging efficient use and minimizing waste and non-essential water loss. Conservation practices should be implemented as a complement to development of new sources of supply and improvements in system-wide firm capacity. Increases in peak daily, monthly and seasonal demands, particularly during periods of drought, drive the need for additional source development. Peak instantaneous demands drive the need for expanded storage and transmission. Uses that contribute to these peak demands should generate sufficient revenue to pay for the facilities necessary to meet the demands. To the extent that conservation can reduce these peak demands, expenses can be avoided.*

The manual specifically describes the policies and multiple methods Aqua NJ intends to follow to prevent lost water. These include the following techniques.

- Water Metering and Tariff Design
  - Source-water metering

    All water sources are metered at the facility entry points to the distribution system and recorded as "send out".
  - Service-connection metering

    All service-connections are metered. Meters used by Aqua NJ conform to standards established by the American Water Works Association. All residential meters are replaced on a 10-year rotation as required by NJBPU regulation.
  - Customer Billing

    Aqua NJ believes prompt and accurate water bills are an important tool to indicate possible leaks.
  - Tariff Design

    Aqua NJ's tariff rates are designed to promote conservation with a uniform commodity charge for each customer class and a low minimum customer charge.

- Meter Ratio Analysis and System Loss – System Use Consists of:
  - Metered Sales
  - Non-revenue use

    The variance between the water delivered to the distribution system from well stations, water plants and interconnects, and system use may reflect losses due to distribution system leaks, breaks, or meter inaccuracies and is defined as unaccounted for water or metered ratio.

    Non-revenue water is defined by AWWA as those components of system input volume that are not billed and produce no revenue. Non-revenue water is equal to unbilled authorized consumption, plus real losses (e.g. leakage, main breaks), plus apparent losses (e.g. metering inaccuracy, theft). Non-revenue uses of water may include street cleaning, firefighting, sewer and water line flushing, flow testing to assess fire protection needs, storage facility draining for maintenance purposes, unmetered public uses, or special franchise agreements.

    Certain mechanical devices such as fire service detector-check valves have been installed to reduce unauthorized use. Aqua NJ instituted a program concerning the deployment of detector-check valves in 1983. This program encompassed the identification of all fire services and the installation of the valves.

    Use of fire hydrants for any purpose other than fire protection is strictly prohibited by Aqua NJ.
- Leak Detection, Repair, and Water Loss Prevention

  In order to reduce water losses due to leakage, Aqua NJ has established a proactive water loss prevention program. The program includes:

  - Conducting regular inspections and soundings of all water main fittings and connections

    This includes the use of electronic listening equipment to sound out possible leaks during annual hydrant and valve inspection/operation programs. Similar techniques are used during service renewals and new installations. On a semi-annual basis, employees inspect storm drains for indications of leakage.
  - Conducting leak noise detection and logging

    Aqua NJ performs acoustic leak detection surveys when visual observations of a leak are not possible to determine the approximate location of a main or service leak.
  - Measure daily, weekly, and monthly flows with portable or permanently installed metering equipment including SCADA systems

    Aqua NJ utilizes SCADA systems and other installed measuring instruments that provide continuous monitoring and recording for each pump station's daily flows and distribution storage facilities levels.
  - Repair and Replacement Policy for leaking mains

    Identified leaks are scheduled for repair continually throughout the year. Unless emergency conditions exist, the repair is scheduled as a routinely

scheduled maintenance activity. However, if circumstances dictate (e.g., water shortage, drought conditions) immediate repairs will be undertaken.

The correlation of operational data with field observations is generally indicative of areas of potential leakage problems. Knowledge of the distribution system, its operating parameters, as well as previous repair history is useful for selecting an area for leak surveys.

Frequent and costly leak repairs are an indicator for replacement. The replacement of pipelines is an ongoing part of a capital investment program for Aqua NJ. The decision to replace pipe has been incorporated in the Distribution System Improvement Charge (DSIC) program and is generally part of the capital budgeting process. However, immediate replacement is sometimes required when leaks are causing damage to customer facilities or causing hazardous situations. These are repaired or replaced immediately.

- Public Education – These types of programs are designed to enhance conservation by fostering community awareness and promotion of good water use habits through enhanced consumer education. Success with these activities requires massive consumer contacts. The methods in use for this purpose are as follows:
  - Consumer education – mailings
  - Community education – public appearances

All Aqua NJ Divisions utilize a free AWWA water audit software package designed to assist with quantifying and tracking distribution system water losses and identify areas for improved efficiency and cost recovery. This assists Aqua NJ management to assess NRW by individual system.

FINDINGS

1. **Aqua NJ's performance in Operations Management on the 2017 Scorecard has been strong, bettering most of the 2017 targets as well as the AWWA benchmark medians.**

Aqua NJ's Operations Management performance has met or favorably exceeded seven of the nine Scorecard targets set and six of nine AWWA benchmark medians.

The tables below show the Scorecard reported Aqua NJ Operations Management and Environmental Compliance data from 2012 through June of 2017 for the metrics that began being tracked in 2017.

Aqua NJ Operations Management Scorecard Metrics Tracked in 2017

Metrics	2012	2013	2014	2015	2016	June 2017	2017 Target	AWWA Median
Water O&M Dollars per Account	NT	NT	NT	NT	$234	$49.41	$49.80	$410
WW O&M Dollars per Account	NT	NT	NT	NT	NR	$122.03	$113.68	$355
Water Chemicals as Cost per 1,000 gallons	$0.12	$0.11	$0.10	$0.10	$0.09	$0.09	$0.09	$0.22
Water Electric as Cost per 1,000 gallons	$0.26	$.29	$.25	$0.28	$0.26	$0.27	$0.26	$0.22
WW Electric as Cost per 1,000 gallons	$.30	NR	NR	NR	NR	$1.75	No Target	$0.37
WW Sludge Removal, Cost per 1,000 gallons	NT	NT	NT	NT	NR	$1.73	No Target	None
Production Metered Ratio	85.5%	85.1%	84.6%	85.1%	85.7%	87.90%	85.00%	None
Total Water Loss, Gallons per Connection per Day	NT	NT	NT	NT	1.018	32	38	47
Purchased Water Lost	NR	NR	NR	NR	NR	NR	NR	None
Purchased Water Loss, Gallons per Connection per Day	NT	NT	NT	NT	NT	NR	NR	47
Work Scheduling, Actual vs. Shift	NT	NT	NT	NT	98.10%	100.00%	100.00%	None
Number/10,000 Accounts priority 3 SOs > 30 days	NT	NT	NT	NT	NR	NR	5.00%	None
WW Jetting, Cleaning, Inspection, Smoke-testing	NR	NR	NR	NR	NR	NR	NR	None
MGD of Water Produced per Employee	NT	NT	NT	NT	0.28	0.25	0.25	0.21
MGD of WW Processed per Employee	NT	NT	NT	NT	NR	NR	No Target	0.19
Turnover Rate	6.12%	6.30%	4.01%	2.0%	10.10%	4.21%	10.00%	7.8%
Water Main Breaks and Leaks per 100 Miles	NT	NT	NT	NT	NR	1.29	No Target	15

O&M – Operations and Maintenance
WW – Wastewater
SO – System Overflow
MGD – Millions of Gallons per Day
NT – Not Tracked; Metric does not appear on the scorecard
NR – Not Recorded; Metric appears on the scorecard but there is no entry for the metric

The Operations Management performance results for each Scorecard metric are explained below.

Water O&M Dollars per Account

Water Operations and Maintenance Cost Ratio tallies the costs of water operations and maintenance and relates them on per-account basis. This metric was not tracked prior to 2016. The June 2017 performance of $49.41 is slightly better than the 2017 target of $49.80. The AWWA benchmark median for this metric is $410.

WW O&M Dollars per Account

Wastewater Operations and Maintenance Cost Ratio tallies the costs of wastewater operations and maintenance and relates them on per-account basis. This metric was not tracked prior to 2017. The June 2017 performance of $122.03 exceeds the 2017 target of $113.68 by 7.3%. The AWWA benchmark median for this metric is $355.

Water Chemicals as Cost per 1,000 gallons

Water Chemicals Cost per 1,000 gallons tallies the cost of water system chemicals per 1,000 gallons of water produced. This metric has been tracked as far back as 2012 and has steadily improved. The June 2017 performance of $0.09 matches the 2017 target. The AWWA benchmark median for this metric is $0.22.

Water Electric as Cost per 1,000 gallons

Water Electric Cost per 1,000 gallons tallies the cost of water system electric energy per 1,000 gallons of water produced. This metric has also been tracked as far back as 2012 and has remained generally consistent. The June 2017 performance of $0.27 exceed the 2017 target of $0.26 by 3.8%. The AWWA benchmark median for this metric is $0.22.

WW Electric as Cost per 1,000 gallons

Wastewater Electric Cost per 1,000 gallons tallies the cost of electric energy consumed per 1,000 gallons of wastewater processed. This metric was tracked in 2012 but has not been tracked since until 2017. The June 2017 performance was $1.75. Although it appears on the 2017 Scorecard, no target has been established. The AWWA benchmark median for this metric is $0.37.

WW Sludge Removal, Cost per 1,000 gallons

Wastewater Sludge Removal Cost per 1,000 gallons tallies the cost of removing wastewater system sludge per 1,000 gallons of wastewater processed. This metric has not been tracked until 2017. The June 2017 performance was $1.733. Although it appears on the 2017 Scorecard, no target has been established. This is not an AWWA benchmark metric.

Production Metered Ratio

Production Metered Ratio is the ratio of water accounted for when all consumers' meters are read and the water delivered to the distribution system from well stations, water plants and interconnects. The variance between system use and water delivered to the distribution system may reflect losses due to distribution system leaks/breaks and/or meter inaccuracies and is defined as unaccounted for water or metered ratio. Aqua NJ has an established goal of 85% for this ratio across the company. This 2017 Scorecard indicates this metric has been tracked since 2012 and has been generally in the range of 85%. June 2017 performance of 87.90% bettered the 2017 target of 85.00%. This is not an AWWA benchmark metric.

Total Water Loss, Gallons per Connection per Day

This metric was not tracked until 2016. The June 2017 performance of 32 bettered the 2017 target of 38. Both the June performance and the 2017 target exceeded the 2016

performance by considerable margin. The AWWA benchmark median for this metric is 47.

Purchased Water Lost

This metric has not been recorded on the Scorecard during the 2012 to 2017 timeframe. No target has been set for 2017. This is not an AWWA benchmark metric.

Purchased Water Loss, Gallons per Connection per Day

This metric has also not been recorded on the Scorecard during the 2012 to 2017 timeframe. No target has been set for 2017. The AWWA benchmark median for this metric is 47.

Work Scheduling, Actual vs. Shift

This metric has been tracked since 2016. The June 2017 performance of 100.00% matches the 2017 target and is an improvement over the 2016 performance of 98.10%. This is not an AWWA benchmark metric.

Number/10,000 Accounts priority 3 SOs > 30 days

This metric is the number of priority 3 wastewater system overflows greater than 30 days per 10,000 wastewater accounts. This metric was not tracked from 2012 to 2015 and was added to the Scorecard in 2016 although it has not been recorded in 2016 and 2017. This is not an AWWA benchmark metric.

WW Jetting, Cleaning, Inspection, Smoke-testing

This metric has been included on the Scorecard since 2012 but performance has never been recorded. This is not an AWWA benchmark metric.

MGD of Water Produced per Employee

Million Gallons per Day (MGD) Of Water Produced per Employee metric has been tracked since 2016. The June 2017 performance was 0.25 MGD versus the 2017 target of 0.25 MGD. The 2016 performance was 0.28 MGD. The AWWA benchmark median for this metric is 0.21.

MGD of WW Processed per Employee

Million Gallons per Day (MGD) Of Wastewater Processed per Employee metric was not tracked from 2012 to 2015. It was added to the Scorecard in 2016 although it has not been recorded in 2016 and 2017 and no target has been set for 2017. The AWWA benchmark median for this metric is 0.19.

Turnover Rate

This metric tallies the employee turnover rate as a percentage per year. It has been tracked since 2012. The June 2017 performance was 4.21% compared to the 2017 target of 10.00%. The AWWA benchmark median for this metric is 7.8%.

Water Main Breaks and Leaks per 100 Miles

This metric was not tracked from 2012 to 2015 but was added to the Scorecard in 2016. However, it was not recorded in 2016 but a 2017 rate of 1.29 was recorded in 2017. No target has been set for this metric. The AWWA benchmark median for this metric is 15.

2. Aqua NJ's performance in Environmental Compliance on the 2017 Scorecard has been strong, bettering most of the 2017 targets as well as the AWWA benchmark medians.

In the Environmental Compliance area, Aqua NJ has favorably exceeded all five Scorecard targets set and exceeded the one AWWA benchmark median tracked in the Scorecard.

The table below shows the Scorecard reported Aqua NJ Environmental Compliance data from 2012 through June of 2017 for the metrics that began being tracked in 2017.

Aqua NJ Environmental Compliance Scorecard Metrics Tracked in 2017

Metrics	2012	2013	2014	2015	2016	June 2017	2017 Target	AWWA Median
DW Compliance Rate	NT	NT	NR	NT	NR	100%	99.50%	None
DW Monitoring and Reporting Violations	4	4	4	4	0	0	1	None
WW Compliance Rate	NT	NT	NR	NT	NR	99.9%	93.0%	None
WW Monitoring and Reporting Violations	3	3	3	3	0	0	1	None
Non-Capacity SSO's per 100 Miles of Collection System	NT	NT	NR	NT	NR	2	2.9	2.9

DW – Drinking Water
WW – Wastewater
NT – Not Tracked; Metric does not appear on the scorecard
NR – Not Recorded; Metric appears on the scorecard but there is no entry for the metric
SSO – Sanitary Sewer Overflow

The performance results for each Scorecard metric are explained below.

DW Compliance Rate

Drinking Water Compliance Rate tallies Aqua NJ's compliance with NJDEP requirements. This metric was not tracked in 2012, 2013, and 2015. It was included on the Scorecard but not recorded in 2014. It was again included in the Scorecard in 2016 but performance was not recorded. The June 2017 performance was 100% while the 2017 target was 99.50%. This is not an AWWA benchmark metric.

DW Monitoring and Reporting Violations

Drinking Water Monitoring and Reporting Violations has been included in the Scorecard from 2012 to present. The June 2017 performance was no violations while the 2017 target was one violation. This is not an AWWA benchmark metric.

WW Compliance Rate

Wastewater Compliance Rate tallies Aqua NJ's compliance with NJDEP requirements. This metric was not tracked in 2012, 2013, and 2015. It was included on the Scorecard but not recorded in 2014. It was again included in the Scorecard in 2016 but performance was not recorded. The June 2017 performance was 99.9% while the 2017 target was 93.0%. This is not an AWWA benchmark metric.

WW Monitoring and Reporting Violations

Wastewater Monitoring and Reporting Violations has been included in the Scorecard from 2012 to present. The June 2017 performance was no violations while the 2017 target was one violation. This is not an AWWA benchmark metric.

Non-Capacity SSO's per 100 Miles of Collection System

Non-Capacity Sanitary System Overflows (SSOs) per 100 Miles of Collection System measure of the collection system piping condition and the effectiveness of routine maintenance. It also was not tracked in 2012, 2013, and 2015. It was included on the Scorecard but not recorded in 2014. It was again included in the Scorecard in 2016 but performance was not recorded. The June 2017 performance was 2 overflows while the 2017 target was 2.9 overflows. The AWWA Median is 2.9 overflows.

3. Aqua NJ presently has no notices of violation or fines and complies with NJDEP sampling requirements.

Aqua NJ's regulatory enforcement and compliance history indicates that the utility is not presently under a significant non-compliance or high priority violation with the US EPA. And, since 2013, Aqua NJ has had several inspections and sanitary surveys by the New Jersey Department of Environmental Protection (NJDEP) that have not resulted in the identification of deficiencies or the issuance of recommendations by State regulators. However, during the Fourth Quarter of 2016, Aqua NJ was in violation of the Safe Water Drinking Act (SWDA) with the NJDEP in connection with the monitoring and reporting of radionuclide contamination in its water. This resulted in the issuance of three Notices of Violation (NOV) in January 2017 for monitoring and reporting of gross alpha, radium, and uranium radionuclides. A much earlier NOV had been issued by the NJDEP in December 2012 for coliform. All of these violations have been resolved.

The US EPA Enforcement and Compliance History Online (ECHO) was reviewed to determine Aqua NJ's regulatory enforcement and compliance history from 2012 to 2017. The results of this review follow.

Aqua NJ underwent four Safe Water Drinking Act (SWDA) compliance monitoring reviews during the 2013 to 2017 timeframe that included three complete sanitary surveys and one site inspection, all under the oversight of the NJDEP. The following table contains the date of the inspection/survey, the statute under which each inspection was conducted, the inspection type, the lead agency involved, and the results of these activities.

Enforcement and Compliance History Online
Facility Summary for Aqua NJ
Compliance Monitoring History
SWDA (Safe Water Drinking Act) Sanitary Survey Results (2013–2017)

Date	Statute	Inspection Type	Lead Agency	Results
06/06/2017	SWDA	Sanitary Survey, Complete	State	No Deficiencies or Recommendations
04/24/2017	SWDA	Site Inspection	State	Results not in ECHO
05/04/2015	SWDA	Sanitary Survey, Complete	State	No Deficiencies or Recommendations
06/12/2013	SWDA	Sanitary Survey, Complete	State	No Deficiencies or Recommendations

No deficiencies or recommendations emanated from the three SWDA complete sanitary surveys conducted by the NJDEP during the 2013 to 2017 timeframe.

The following table summarizes Aqua NJ compliance status as of September 30, 2017.

Enforcement and Compliance History Online
Facility Summary for Aqua NJ
Compliance Summary Data

Statute	Current Significant Non-Compliance or High Priority Violation	Current As Of
SWDA	No	09/30/2017

As of September 30, 2017, Aqua NJ had no significant non-compliance conditions or high priority violations with the US EPA or NJDEP under the SWDA.

The following table identifies the number of calendar quarters in the past three years during which Aqua NJ was in a violation status, the violation type, and the dates in violation.

Enforcement and Compliance History Online
Facility Summary for Aqua NJ
Three Year Compliance Status by Quarter

Statute	Program/Pollutant/Violation Type	Number of Quarters In Violation	Dates in Violation
SWDA	Radionuclides	1	10/01/2016 to 10/12/2016

Aqua NJ was in a violation status during one quarter during the 2015 to 2017 timeframe. The October 2016 violation was resolved.

The following table identifies the enforcement actions taken from 2013 to 2017, the lead agency involved, and the date that each enforcement action was taken against Aqua NJ.

Enforcement and Compliance History Online
Facility Summary for Aqua NJ
Informal Enforcement Actions (2013–2017)

Statute	Type of Action	Lead Agency	Date
SWDA	State Formal Notice of Violation	State	01/23/2017
SWDA	State Formal Notice of Violation	State	01/23/2017
SWDA	State Formal Notice of Violation	State	01/23/2017

Aqua NJ was cited by NJDEP with three formal notices of violation (NOVs) on January 23, 2017 for inadequate radionuclide monitoring and reporting. The violations occurred in October 2016 but have been resolved.

The following table identifies the contaminant involved, the violation description, the violation status, and the date of compliance for Aqua NJ violations and enforcement actions since December 2012.

Enforcement and Compliance History Online
Facility Summary for Aqua NJ
SDWA Violations and Enforcement Actions (2012–2017)

Statute	Lead Agency	Contaminant	Violation Description	Status	Date of Compliance	Date Violation Issued
SWDA	State	Radionuclides-Gross Alpha excl. Radon and Uranium	Monitoring and Reporting	Resolved	Oct 16	Jan 17
SWDA	State	Radionuclides-Combined Radium	Monitoring and Reporting	Resolved	Oct 16	Jan 17
SWDA	State	Radionuclides-Combined Uranium	Monitoring and Reporting	Resolved	Oct 16	Jan 17
SWDA	State	Coliform	Monitoring and Reporting	Resolved	Dec 12	—

The three NOVs issued with which Aqua NJ was cited in January 2017 for inadequate monitoring and reporting were resolved. An earlier NOV was issued for coliform monitoring and reporting and was resolved in December 2012.

4. Aqua NJ has controlled its O&M costs well over the past five years.

The following table provides a comparison of O&M costs to customer count from 2012 to 2016.

Aqua NJ
Operations and Maintenance Expense per Customer

Element	2012	2013	2014	2015	2016	Percent Change 2012–2016
Operations and Maintenance Expense ($000)	14,581	14,727	14,345	15,167	15,229	4.44%
Total Customers	56,513	56,915	57,703	58,066	58,639	3.76%
O&M Cost per Customer ($)	258.01	258.75	248.60	261.20	259.71	0.7%

During the 2012 to 2016 timeframe, Aqua NJ's O&M expense per customer increased 0.7%, well below the inflation rate.

5. Aqua NJ has taken effective measures in all Divisions to identify and reduce non-revenue water and is below the average of other New Jersey water utilities.

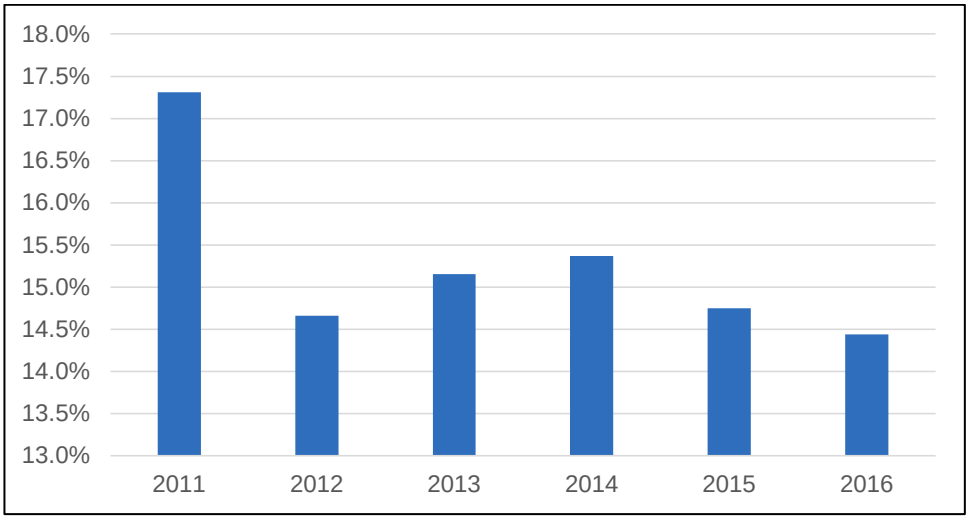
Although lost water in Aqua NJ's Northern Division has been high, especially in Phillipsburg where the system is very old, recent mitigation efforts have been effective in reducing lost water levels. Lost water in the Northern Division has been reduced from 37% to 30% in the most recent audit. These improvements have been accomplished through the use of acoustic logging to determine leakage at various system locations to prioritize main replacements. A contractor has been retained to analyze acoustic readings of leakage and mains have been prioritized for replacement accordingly.

The next Northern Division initiative is the replacement of production venturi meters to obtain more accurate flow volume readings. The currently installed venturis are 1967 vintage and are believed to be inaccurately measuring "send out" water which gives the appearance of lost water. The production water readings (wells) are suspect because they differ from treatment outlet water readings that are known to be accurate.

In other Aqua NJ Divisions, lost water is well managed. NRW in the Central Division is an acceptable 12% while the Southern Division is trending near zero. Overall, the Aqua NJ NRW average for 2016 was 14.3%.

The graph below shows Aqua NJ's non-revenue water for six years:

Aqua NJ Percent Non-Revenue Water

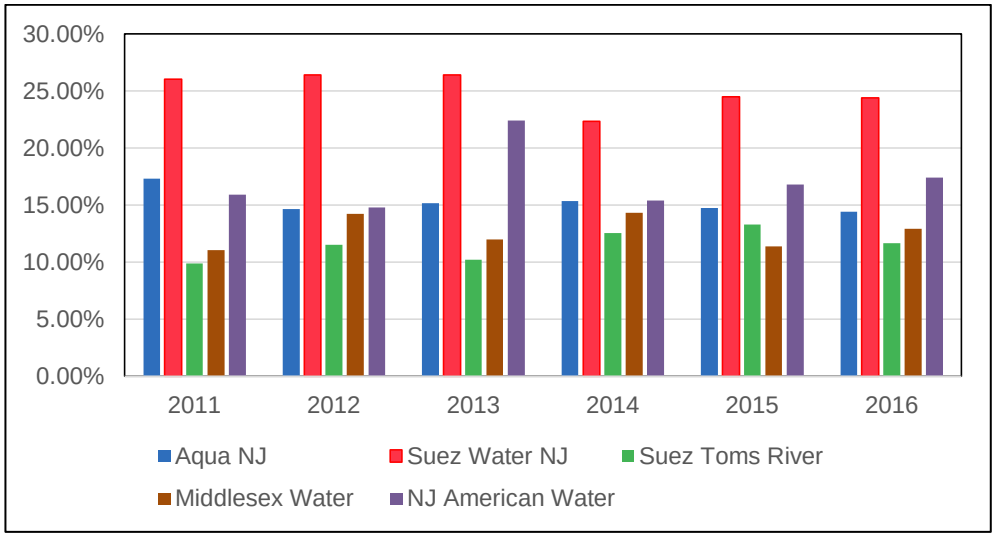


Metric	2011	2012	2013	2014	2015	2016
Percent Non-Revenue Water	17.31%	14.66%	15.15%	15.37%	14.75%	14.44%
System Gallons (thousands)	4,973,360	4,973,481	4,625,032	4,727,260	4,940,016	4,928,268

Aqua NJ reported in its NJBPU Annual Reports that its non-revenue water ranged from a high of about 17% in 2011 to a low of about 14% in 2016. Non-revenue water for Aqua NJ has been declining since 2014.

SAGE compared non-revenue water data for Aqua NJ to a panel of four other New Jersey water utilities comprised of Suez Toms River, Suez Water NJ, NJ American, and Middlesex Water, for the period 2011 through 2016. The graph and table below show non-revenue water reported by Aqua NJ and the four other New Jersey water utilities:

Aqua NJ Non-Revenue Water Compared to NJ Panel Utilities

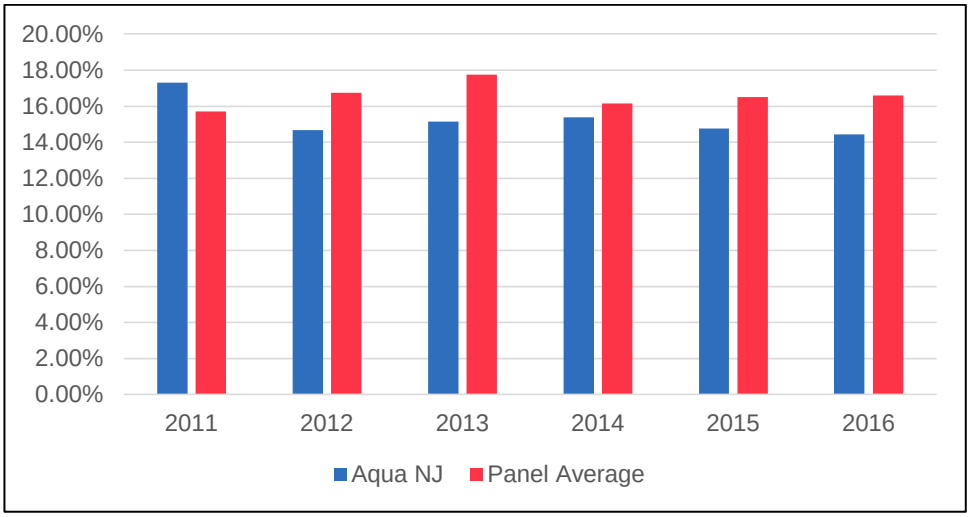


Utility	2011	2012	2013	2014	2015	2016
Aqua NJ	17.31%	14.66%	15.15%	15.37%	14.75%	14.44%
Suez Water NJ	26.04%	26.40%	26.40%	22.37%	24.51%	24.40%
Suez Toms River	9.87%	11.50%	10.22%	12.53%	13.31%	11.65%
Middlesex Water	11.05%	14.23%	12.01%	14.33%	11.40%	12.91%
NJ American	15.90%	14.80%	22.40%	15.40%	16.80%	17.40%

Between 2011 and 2015, Aqua NJ and Suez Water NJ non-revenue decreased while the other utilities non-revenue water increased.

The graph and table below depict the average Aqua NJ non-revenue water compared to the average of the panel.

Aqua NJ Percent Non-Revenue Water Compared to NJ Panel Average



Utility	2011	2012	2013	2014	2015	2016
Aqua NJ	17.31%	14.66%	15.15%	15.37%	14.75%	14.44%
NJ Panel Average	15.90%	14.80%	22.40%	15.40%	16.80%	17.40%

Between 2011 and 2015, Aqua NJ's non-revenue water has declined while the panel average increased.

6. Aqua NJ workforce productivity improved substantially during the 2013 to 2016 timeframe.

The following table provides a productivity analysis for Aqua NJ.

Aqua NJ Workforce Productivity Analysis (2013–2016)

Metric	2013	2014	2015	2016	Percent Change 2013–2016
Number of Aqua NJ Employees	50	50	51	49	-2.0%
Total Customers	56,915	57,703	58,066	58,639	3.0%
Total Customers per Employee (to the nearest whole customer)	1,138	1,154	1,139	1,197	5.2%
Gallons Sold (Millions)	3,958	4,000	4,221	4,217	6.5%
Gallons Sold per Employee (Millions)	79.2	80.0	82.8	86.1	8.7%

In both customers per employee and gallons per employee, the Aqua NJ workforce productivity increased during the 2013 to 2016 timeframe. The Aqua NJ headcount varied in a tight range from 49 to 51 employees, ending the period with 49 employees or 2.0% lower than at the start. The gallons sold per employee increased by 8.7% over the period.

7. The revamping of the Scorecard for Aqua NJ has introduced some improvements but some aspects of the new Scorecard detract from its usefulness.

The revised Scorecard includes several new metrics that were not utilized in previous years' versions of the Scorecard that should be useful to Aqua NJ management. These added metrics include several per unit costs that are useful for managing the business more efficiently.

However, five of the 17 Operations Management metrics are missing or are otherwise not being tracked. These should be measured and entered in the Scorecard. Also, seven metrics do not have targets assigned for them. Without targets assigned, these metrics are of limited usefulness. Furthermore, many of the targets appear to be based on the actual performance levels of previous years and offer little challenge or opportunity for further performance improvement.

Additionally, Safety performance is not shown on the Aqua NJ scorecard for 2017, although it was included in previous years. The elimination of safety metrics from the Scorecard and the establishment of a separate dashboard for safety performance detract from the Scorecard's usefulness. A separate dashboard is produced for safety performance tracking that shows green and red cell displays for performance in various safety metrics. Safety is a critical management responsibility and should be included on the Scorecard. Safety performance does comprise 15% of the short-term incentive compensation program award.

8. Aqua NJ safety performance has been inconsistent.

The following table shows the Aqua NJ Safety Scorecard Metrics tracked during the five years prior to the elimination of safety metrics from the Scorecard in 2017.

Aqua NJ Safety Scorecard Metrics Tracked in 2012 to 2016

Metric	2012 Actual	2012 Target	2013 Actual	2013 Target	2014 Actual	2014 Target	2015 Actual	2015 Target	2016 Actual	2016 Target
OSHA Lost Work Days	21	10	NR	10	NR	20	3	20	40	21
OSHA Lost Work Days Instances	1	1	NR	1	NR	1	1	1	1	1
NR – Not Recorded; Metric appears on the scorecard but there is no entry for the metric										

Aqua NJ's safety performance during the 2012 to 2016 period was somewhat spotty and difficult to judge. In 2012, the OSHA Lost Work Days actual performance of 21 days lost exceeded the target of 10 days. In 2013 and 2014, a comparison of performance in this metric was not possible since the actual number of days was not recorded. 2015 was the only year that Aqua NJ's performance compared favorably with the year's target. In that year, three lost work days were recorded against a 20 day target. In 2016, the OSHA Lost Work Days actual performance of 40 days lost exceeded the target of 21 days. A positive aspect of Aqua NJ's safety performance was that in each year for which performance was recorded (2012, 2015, and 2016), only one lost days safety event was recorded for the year.

RECOMMENDATIONS

1. **Further upgrade the Aqua NJ Scorecard by entering actual performance data for all metrics that are included on the Scorecard and assigning targets for all metrics being tracked. (See Finding 7)**

The 2017 Aqua NJ Scorecard fails to achieve its intended informational purpose because the information it contains is sometimes incomplete. Additional improvements that should be implemented include the following:

- Measuring and entering actual data for all metrics listed. All metrics should have the actual performance data entered or be dropped from the Scorecard until the actual data can be measured and entered.
- Setting targets for all metrics. All Scorecard metrics should have targets assigned. Targets should be set so as to offer a challenge to management for achieving them as well as offering the opportunity for improving performance.
- Including employee safety metrics. Safety is a critical management responsibility and should be included on the Aqua NJ Scorecard. Separating Safety performance reporting detracts from the Scorecard's usefulness.

2. **Aqua NJ should ensure that its Safety performance is completely and accurately registered on the Scorecard. (See Finding 8)**

Employee safety is among the most important responsibilities of management. Complete and accurate reporting of Safety performance on the Scorecard must be accorded the highest priority by Aqua NJ management.

E. PRACTICES AND PROCESSES

The system operations practices and processes (i.e., the way work gets done) are standardized and generally consistent among the four Aqua NJ Divisions.

It is an overall Aqua NJ management objective that "every employee can do everything" within the Divisions. This means that all employees are familiar with the centralized customer service system, the customer work order system, and the maintenance work order system; can perform meter reads and locates; and can perform all job duties interchangeably. Aqua NJ provides every Field Service Worker (FSW) and Operator a service vehicle (pick-up truck), a field service tablet device, and a work cell phone.

FIELD INFORMATION TECHNOLOGY

Aqua NJ system operations are supported by several information technology systems and hardware. These include the following:

Customer Service Order System

This is the customer service work management tool that provides customer service order assignments to Aqua NJ's field service workers. Service order assignments are made by the National Dispatch Team from the control center in Bryn Mawr. The process is described in the Work Management subsection below.

Maintenance Work Order System

This is the maintenance management system that is used to manage and assign corrective maintenance, preventive maintenance, underground locates, and other maintenance activities in Aqua NJ. The Asset Management initiative relies on this maintenance work order system as its backbone technology. Maintenance work order assignments are again made by the National Dispatch Team from the control center in Bryn Mawr. The process is also described in the Work Management subsection below.

Maintenance Work Efficiency System

This is a business intelligence tool for supervisory personnel. It houses employee performance information including efficiency and work history. It operates with data input from the maintenance work order system data base and is used to analyze the average time required to complete maintenance tasks and the time required to complete tasks by each individual worker.

Meter Reading System

This system assists Aqua NJ FSWs with meter reading as they drive meter reading routes. The system downloads reading assignments, collects daily reads, and uploads reading and consumption data into the centralized customer information system.

Automatic Vehicle Location System

The Automatic Vehicle Location (AVL) system is a global positioning based system (GPS) that provides data on Aqua NJ field vehicle locations and driver history. The system is integrated with the customer service order system. All Superintendents and Foremen have been trained to use this system. The system permits Division Superintendents to monitor the location of each FSW vehicle while monitoring the completion status of assigned work orders in the service order system.

System Control and Data Acquisition Systems

System Control and Data Acquisition (SCADA) systems are located at each Aqua NJ Division headquarters to control and monitor system operation. Individual system components for water and wastewater systems are graphically depicted by the system on a desktop computer monitor. This includes wells, tanks, pumps, filtration equipment, and other system equipment. The SCADA systems depict the status of each system component, i.e., on/off, flow rate, tank level, temperature, pressure, and various other operating parameters needed to effectively monitor and operate the system. Alarm conditions are also highlighted.

Field Service Tablet

Each Aqua NJ FSW and Operator is provided a field service tablet device. The tablet provides FSWs and Operators in the field with wireless access to both the Customer Service Order and Maintenance Work Order Systems. Although the two systems are independent, each FSW has access to both on the same tablet. The tablet permits FSWs to receive work assignments and report completion directly in the field.

SCADA Laptop

Secure laptop devices were recently issued to the Aqua NJ Divisions to provide remote, secure access to Division SCADA systems. These laptops were issued as part of the Aqua NJ cybersecurity upgrade. The devices provide enhanced security and password encryption and will be carried by the on-call operator and each Division Superintendent.

WORK SCHEDULE

The standard workday for employees begins at 8:00 AM and ends at 4:30 PM, Monday through Friday. There are two scheduling "wheels" to cover off-shift work needs, one for on-call work and one for scheduled weekend overtime work. In addition, although all plants are automated, one employee in each Division is designated "on-call" each week to respond to SCADA alarms and other emergencies. Further, there is sampling and preventive maintenance work on weekends that is covered by scheduled overtime. On-call and scheduled weekend overtime work rotates among the employees of each Division according to the scheduling wheels. The on-call employee is guaranteed seven hours of standard rate pay each week. The first call-out is a minimum of 2.7 overtime hours and the second call-out is a minimum of 4.0 hours of overtime. Employees may trade on-call and weekend work with others within each Division according to seniority.

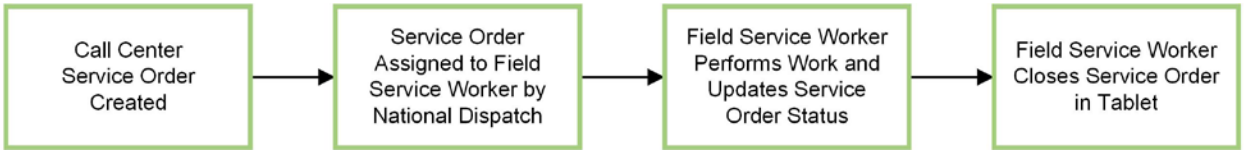
WORK MANAGEMENT

Aqua NJ relies on two work management systems to manage its field work activities. The first is a customer field service order system and the second is a maintenance work order system. Both systems are accessible to all Operators and Field Service Workers (FSWs) by tablet devices provided by Aqua NJ. The tablets have a feature that allows field personnel to use both systems seamlessly. Aqua NJ is small enough that many employees do work from both systems. A larger state operation may have employees who do customer field service work orders or maintenance work orders exclusively.

Customer Field Service Orders

Customer Field Service work orders (service orders) can include turn-ons and turn-offs, leak investigations, meter replacements, and other customer-facing actions. The overall national customer field service order process is shown below.

Customer Field Service Order Process



Customer field service work orders (service orders) are entered into the customer work order system at the Customer Service Centers (call centers). Please see Chapter IV, Customer Service, for more information on the Customer Service Centers. Service orders are then assigned to individual FSWs by the National Dispatch Center in Bryn Mawr to complete.

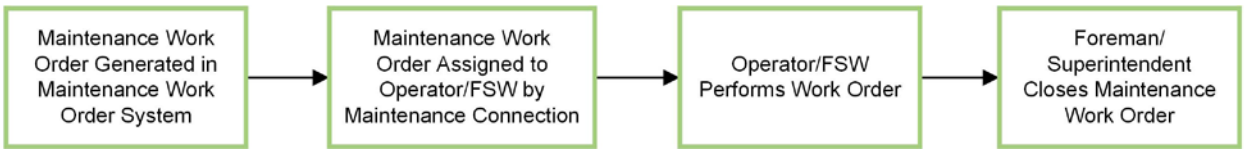
Each FSW is able to view assigned service orders on the tablet including schedule commitments, such as morning or afternoon customer appointments. The location of

each FSW vehicle is monitored locally using the installed auto vehicle location system. The status of assigned work orders is updated in the system by the FSW at each stage (e.g. travel to site, arrived at site, and work completed). As service orders are completed, this information is available to the Customer Service Centers to inform customers, as appropriate.

MAINTENANCE WORK ORDERS

Maintenance activities are managed in a similar manner except that maintenance work orders are generated within the maintenance work order system. Maintenance work orders are originated internally in each Division to complete corrective maintenance or preventive maintenance actions (e.g., valve maintenance, treatment plant repairs, and main and service leak investigations). Underground locates are also managed with the maintenance work order system. The overall maintenance work order process is shown below.

Maintenance Work Order Process



Work orders are generated and assigned by the maintenance work order system to Operators and FSWs to complete. Once the work order is completed, it is reviewed and closed by the division foreman or supervisor.

Preventive maintenance actions are generated based on the calendar (e.g., weekly, monthly, or quarterly). A maintenance efficiency system is also used to monitor and analyze the time required to complete maintenance tasks on average and by individual worker. This is useful in scheduling and assigning work tasks to give each worker a full work load.

ASSET MANAGEMENT

Asset management (AM) is being developed in all the Aqua America states, including Aqua NJ, according to a template specified by Regulated Operations. The primary objective of the program is to improve reliability. The AM program is based on the US Environmental Protection Agency (EPA) framework. The AM initiative relies on the maintenance work order system as its backbone transaction technology with GIS serving as the database for the program. Each state has representatives who sit on the AM steering committee with the Operations Director and State Engineer designated as the primary parties involved in each state.

Nationally, the initial activity of the AM program has been the completion of condition assessments for the wells in the water systems. Risks have been assessed, primarily the consequences of well failures and the impact on service levels (what the customer will experience if certain equipment fails). The next area of focus after the wells will be the water distribution systems. A hierarchy of assets (parent and child relationships of assets and their parts) is being developed that will assist rehabilitation and replacement planning along with an evaluation of the level of risk associated with particular assets

and their maintenance histories. The intent is to avoid adverse customer experiences. AM is expected to enhance materials management efforts as well, particularly for inventory management – having the right parts at the right place.

The AM risk assessments are conducted using desktop knowledge of conditions and assets and are scored from 1 to 5 depending on the assessed risk of failure where a 1 is new, low risk equipment and a 5 is imminent failure, high risk equipment. Advanced assessment techniques that identify failure modes, mortality, capacity impact, and level of service impact are to be incorporated into the program in the future.

Although a national initiative, AM for Aqua NJ is limited to an aspirational effort at this time. Presently, Aqua NJ is in the early stages of AM program implementation. Asset hierarchies (parent-child asset records) have been identified in some Divisions for tanks, treatment plants, lift stations, valves, hydrants, buildings, pumps, and motors. However, risk assessments for system wells are still pending. Consultant assistance is anticipated to be needed for program development in New Jersey.

The DCOO works extensively with the Director of Corporate Engineering, the Aqua NJ Operations Director, and the Aqua NJ State Engineer on the AM program in New Jersey. The State Engineer is involved in long term fixes associated with high consequence assets. This will involve incorporating the Aqua NJ AM program outputs into the capital plan once the program is implemented.

METERS

Aqua NJ water services are metered, while wastewater service billing is based on metered water consumption. Each Aqua NJ Superintendent is responsible for overseeing field meter operations in his Division which includes meter ordering, sending meters for testing, meter installation and removal, other meter-related site visits (e.g., leak reports, high bill complaints, and theft-of-service reports), and meter reading. FSW's from each Division perform drive-by meter reads on a part time basis according to the meter reading schedule. Please see the Chapter IV, Customer Service, for more information on meter reading and billing.

All meters have remote radio frequency (RF) reading capability. For customer move-ins, FSWs read the meter and turn the water on. For move-outs, the FSW reads the meter and then turns the water off. FSWs also do meter installation for new construction as well as performing vacant home checks and inactivity (zero consumption or no read) checks. All FSWs have company cell phones and call customers in advance before visits and for over the phone problem resolution.

New Jersey has a regulatory rule that all meters must be tested at least once every ten years. Aqua NJ replaces meters on this schedule and the removed meters are sent for testing. A national level meter testing vendor performs the testing which is pass/fail. Approximately 3,000 meters are tested annually in New Jersey. Meters are accumulated at Division facilities until they are delivered to the meter testing contractor. Failed meters are scrapped and passed meters are reused. The Aqua NJ Operations Support Coordinator has the responsibility for tracking and recording reused and scrapped meters.

CONTRACTOR USE

Aqua NJ contracts for all excavation, capital construction, and heavy operations and maintenance work, such as main break repairs.

Emergency Work Requiring Heavy Equipment or a Crew

Each Aqua NJ Division has a relatively limited staff of service and plant operations personnel and has no heavy equipment such as backhoes, compressors for jack hammers, and dump trucks. As a result, each Division has an emergency contractor that performs main leak repairs along with valve and hydrant repairs and installations, service replacements, and similar emergency requirements not associated with the main replacement program. Each emergency contractor is engaged for a three-year term and these contracts are rebid by the Aqua NJ State Engineer at the end of the term. The contracts are bid on a unit price basis. Repairs that exceed the capitalization threshold, such as three feet or more of main replaced, and all valve, service, and hydrant installations and replacements are capitalized.

Main Replacements

A separate contractor, one for each Division, performs main, service, valve, and hydrant replacement program work, including Distribution System Improvement Charge (DSIC) work. This program is managed by the State Engineer. These are separate annual contracts, for all main and service replacements for the year, although multi-year DSIC projects may be assembled into a single bid package rather than bid multiple times. These contracts are also unit priced.

Aqua NJ bids main replacement contracts based on unit prices in case individual projects change during the contract period. Aqua NJ does take-offs on each project so it knows the number of units expected and can compare contractor bids on total prices. Once work is under way, the units reported for each project can be compared to the units expected.

Treatment Plant Capital Projects

Additionally, each treatment plant improvement project is contracted separately as fixed price contracts. These contracts may be for design or construction, and some for highly specialized equipment including ongoing maintenance.

Contractor Evaluation

Contractor performance is internally evaluated by the Aqua NJ Engineering and Division Superintendents on a project-by-project basis. The following aspects of contractor performance are evaluated for each project:

- Availability
- Responsiveness to schedule requirement
- Response time to questions and performance issues
- Method, accuracy, and timeliness for submitting invoices and reports
- Reliability
- Change order requests

Construction Inspections

The inspection of Aqua NJ contractor-performed construction work is subcontracted to outside engineering firms. Daily inspections are performed that include recorded observations of construction site conditions and activities. Specifically, the following items are inspected and/or recorded.

- Materials used
- Labor present
- Equipment present
- Site location
- Weather conditions
- Identity of inspector
- Contractor time on/off job site
- Visitors
- Narrative description of work
- Additional specifics of materials laid and location

UNDERGROUND LOCATES

All Aqua NJ underground locates are performed by company employees and all Aqua NJ Divisions perform "call before digging" mark-outs. All FSWs and Operators are qualified to perform mark-outs. It is estimated that 0.5 full time equivalent (FTE) is required in each Division to support this activity. The maintenance work order system is used to schedule and manage system underground locates. There is a three day timeframe for completing routine request locates. Emergency locates must be responded to within two hours of notification of the emergency.

Aqua NJ underground locate activities are performed under the guidance document, "Aqua NJ One-Call Damage Prevention Protocol," that describes the one-call procedures, communications, documentation, training, and reporting requirements for underground locates. This guidance conforms to the requirements of N.J.A.C. 14:2-1.2.

EMPLOYEE LICENSING

Aqua NJ Operators and FSWs are required by New Jersey to hold licenses appropriate to their duties. Licensing is administered by the NJDEP. New Jersey licenses are classified by the type of system operated as described in the table below.

New Jersey Operator License Types

License	System Type
S	Public Wastewater Treatment System
T	Public Water Treatment System
N	Industrial Wastewater Treatment System
C	Public Wastewater Collection System
W	Public Water Distribution System

The size of the system being operated is designated by a number classification following the license type. These classifications denote the population served by the system that the licensee operates. For instance, a C license has the following possible size classifications:

New Jersey C Operator License Classifications

System Class	Population Served
C1	251 to 1,500
C2	1,501 to 15,000
C3	15,001 to 50,000
C4	50,001 or more

These classifications vary by license type.

At Aqua NJ, the Foreman position requires W2, T2, and C2 New Jersey operator licenses and is expected to train new employees. The Plant Operator I's hold W3, T3, and C1 operator licenses. Plant Operator II's hold S2 and C2 licenses. Field Service Worker II's have at least five years' experience and hold a W2 license. Field Service Worker I's have less than five years of experience and hold a lower level license. A basic license requires one year of experience and school completion. The seasonal positions are generally assigned unskilled labor tasks that do not require a license.

Operator licenses are renewed every three years. This process involves completion of various courses for continuing education provided by New Jersey Water, American Water Works Association (AWWA), and the State of New Jersey. For Level II license renewal, 36 technical contact hours (TCHs) are required, while 18 TCHs are required for Level I license renewal. Each licensed employee is expected to monitor his or her own continuing education status for license renewal, which is easily tracked.

FINDINGS

1. **Aqua NJ Operators and Field Service Workers, with few exceptions, begin each work day by reporting to Division offices before proceeding to assigned work locations.**

Operators and FSW's generally report to their respective Division office and then proceed from there to their first work assignments of the day. Similarly, they presently end their work days by returning to the Division headquarters. If they were dispatched directly from home and completed their work day at their work assignments, considerable additional work could be accomplished and windshield time avoided during the work day.

With the technology presently in use, there is no need to go to the office except for periodic materials replenishments and superintendent meetings. And, most training is computerized. The AVL system is in use that provides real time location information on Aqua field vehicles and Aqua driver history. All Superintendents and Foremen have been trained on its use and are able to monitor the whereabouts of individual employees.

2. **A business intelligence tool is used to monitor and analyze the average time required to complete maintenance tasks by task and by individual worker.**

Aqua NJ utilizes a business intelligence tool that provides maintenance scheduling information to supervisory personnel. It is a repository for employee performance information including efficiency and work history. It operates with data input from the customer service order system data base. This is very useful in scheduling and assigning work tasks.

3. **Field tablet devices for Aqua NJ FSWs do not yet have the capability to access GIS.**

Although the FSW tablet devices are configured to access both the customer service order system and the maintenance work order system, they cannot yet access the GIS. Aqua NJ field personnel must refer to paper maps of its systems. This is very inefficient for field workers and requires periodic paper map updates rather than real time electronic updates. Referring to paper maps would be eliminated if tablets had access to GIS.

4. **Although outside meter installation is the preferred location for maintenance convenience and to avoid entering the customer premises, 90% of Aqua NJ's water meters are inside.**

Although outside meter installation is preferred for maintenance efficiency and reduced customer inconvenience, most Aqua NJ meters are located inside customers' premises requiring customer involvement for maintenance and replacement access to the meters. Presently over 49,000 meters are located inside customer premises while approximately 5,100 are located outside as shown in the following exhibit.

Aqua NJ Meters Installed Inside versus Outside

Division	Inside	Outside
Northern	12,640	350
Central	18,242	789
Southern	16,474	1,732
Eastern	2,050	2,233
Totals:	**49,406**	**5,104**

There are varying numbers of outside meters in the Divisions but most are located inside, with the exception of the small Eastern Division. Having inside meters is not a significant meter reading problem because of the RF remote meter reading capability. However, FSWs must still periodically gain access to premises to maintain the meters and the radio units. This requires coordination with the customers and the work takes longer than with outside meters. Also, inside meters can leak causing damage to the customer's premise.

New construction meters are presently being installed using outside meter pits for greater meter accessibility. This is the preferred location for maintenance efficiency. However, Aqua NJ has not analyzed the costs and benefits of moving inside meters outside.

5. **Although Aqua NJ performs evaluations of contractor performance following projects, there is no indication that the results of these evaluations are memorialized for reference during future contract bid evaluations.**

Following the completion of each project, the State Engineer and Division Superintendent discuss the contractor's overall performance and make a determination on whether to utilize the contractor again for future projects. However, there is no documentation of the results of the discussion and no way for others to refer to the evaluations.

RECOMMENDATIONS

1. **Aqua NJ should consider home dispatch for Operators and Field Service Workers. (See Finding 1)**

With existing GPS technology, the Superintendents and Foremen have the ability to monitor the locations of Aqua NJ workers' vehicles. National Dispatch also schedules work to the workers' tablets electronically. Greater efficiency could potentially be achieved if Operators and FSW's reported directly to their first work assignments at the beginning of the work day than to report to the Division office and then proceed to their work assignments. Likewise, the workers could end their days at their last work assignment rather than returning to the Division headquarters. One Aqua NJ worker assigned to remote water and wastewater systems already begins and ends his work day at his first and last work assignments. The field employees could still visit the Division headquarters as necessary to restock meters and other parts and supplies and to receive any live training and communications.

2. **Consider adding the capability to access the Aqua NJ GIS to the FSW tablet devices. (See Finding 3)**

Including access to GIS on FSW tablet devices would be a substantial efficiency improvement for field work, alleviating the need for FSWs to refer to paper maps of systems and service designs.

3. **Perform a cost-benefit analysis to determine the cost effectiveness of moving meters from inside customer premises to outside meter pits. (See Finding 4)**

The benefits over the long term of moving meters outside may be meaningful. Aqua NJ should determine the feasibility of such a program.

4. **Formalize the contractor performance evaluation process and record the results for reference during future contract bid evaluations. (See Finding 5)**

Aqua NJ presently performs post-project contractor performance evaluations; however, these would have greater effectiveness with a formalized process and recorded results.

F. SYSTEM PLANNING, FACILITIES, AND LAND MANAGEMENT

On a biennial basis, Aqua NJ develops a "Statewide Facilities Planning/Procedures Report" to communicate the results of its system planning efforts within Aqua NJ and Aqua Services. The report reviewed for this audit was the 2015 version. The report is developed for each Aqua NJ Division and considers each water and wastewater system in each Division. The development of the report is the collaborative effort of

Environmental Compliance (formerly Water Quality and Wastewater), Engineering, and Accounting.

Every other year, all water storage tanks and wastewater tanks are inspected by an independent firm that specializes in water storage tank inspections, underwater inspections, and protective coatings inspection as part of a tank asset management plan. These inspections generate routine maintenance and repair tasks.

Every three years, a well inspection and maintenance program is completed by an independent firm that provides an analysis of the existing conditions of each water supply well and routine maintenance on the pumps and motors.

FINDINGS

1. The system planning process for Aqua NJ effectively identifies water and wastewater system capital program needs.

The system planning process considers critical water and wastewater system conditions and needs for each individual system in each Division. The planning process assembles and analyzes relevant information needed to respond to and manage growth, compliance, and system reliability needs. The planning effort includes demand projections, customer count projections, source of supply needs, specific compliance needs, storage requirements, and known specific developer needs.

The system planning process includes assembling, reviewing, and analyzing for each water and wastewater system the following information:

- Demand Projections for Existing Customers that include:
  - Average Day Demand
  - Average Day Peak Month
  - Peak Day
  - Customer Count
  - Average Day/Customer
  - Average Day, Peak Month Customer
  - Metered Ratio (water metered vs. water delivered to distribution system)
- Growth Projections that include:
  - Historic Customer Count each year for the past 13 years
  - Average Customer Count for last five years
  - Production Projections including five year, ten year, and 15 year projections
- Sources of Supply that include:
  - Contaminant Issues (existing and projected regulations)
  - Supply Allocations including five year, ten year, and 15 year projections
  - Firm Capacity Determination for Growth
- Distribution System capacity
  - Infrastructure Issues
  - Storage Requirement Projections

  - Fire Protection Growth Projections
- Meters
- Expense Reducing Projects
- Developer Contributions

Additionally, assessments are made for each Division of any deficiencies for the 15-year planning time horizon and any actions that should be taken. Solutions are developed for identified deficiencies and capital projects are added and prioritized by specific need.

The output of this system planning process is used for allocating funding for water and wastewater capital projects throughout each Division. Capital projects are added and prioritized by specific need, as required to achieve compliance, ensure adequate capacity, or accommodate growth. Capital projects are then included in the capital budget that is developed by the State Engineer and reviewed by Aqua Services Regulated Operations management before presentation to the Board for approval.

2. Aqua NJ does not have a facilities management plan or strategy.

Aqua NJ owns and operates numerous facilities in New Jersey; however, there are no specific facilities management plans or strategies for managing these facilities. Janitorial services are utilized for some offices; otherwise, Operators perform janitorial tasks at water and wastewater treatment facilities. An Aqua NJ facility inventory is maintained that lists the name, type, and general location of Aqua NJ facilities.

3. Aqua NJ does not have a land/real estate management plan or strategy.

Aqua NJ owns extensive land and real estate assets in New Jersey. However, there are no apparent strategies or plans for managing these properties to optimize their value. Aqua NJ does maintain a listing of its real estate holdings.

RECOMMENDATION

1. Aqua NJ should develop a facilities management plan and a land/real estate management plan to optimize the value of its facilities and real estate holdings. (See Findings 2 and 3)

Focusing attention on facilities and land/real estate management strategies and plans should improve the value and productivity of these holdings.

G. CAPITAL PROGRAM

Aqua NJ capital program planning and management is the primary responsibility of the State Engineer. More specifically, the State Engineer's capital program responsibilities include:

- Preparation of the five-year and annual capital budget (the five-year budget functions as a capital program plan with the first year being the capital budget)
- Preparation of bid packages and participation in contractor selection for all capital program contracts
- Preparation of the engineering portion of Distribution System Improvement Charge (DSIC) program filings to the NJBPU

- Maintaining the hydraulic models for the Aqua NJ systems that are modeled (this responsibility was recently taken over from the Aqua America hydraulic modeling group).
- Participation in emergency planning for facilities including emergency generators, pumps, water tanks, diesel fuel storage, and stockpiling of materials
- Managing all capital program contracts and contractors including invoice approval
- Interfacing with developers

CAPITAL PROGRAM

The Aqua NJ capital program has several major components:

- The main replacement program (including the DSIC Program)
- Well replacements, additions, and upgrades
- Water and wastewater treatment plant expansions and upgrades
- Regular main repairs, service replacements, valve replacements, and hydrant replacements
- New mains, services, and meters
- Meter change outs

Main Replacement Program

The main replacement program includes planned replacement of water mains, valves, hydrants, and service lines. Facilities selected for replacement each year begin with nominations from the Division Superintendents (without cost estimates) sometimes based on leak studies. Factors that are considered in selecting mains for replacement include:

- Problem materials, such as asbestos, cement, or plastic
- Leak and lost water history
- Age of the pipe, such as 100 year old cast iron
- Need for increased volume of water (larger pipes)

Main replacement decisions are made based on such parameters as water quality, pipe size, fire hydrants, breaks, and customer complaints associated with the main. From time-to-time, the State Engineer requests a summary from each Division of the leak reports for main replacement project planning purposes. Corporate Engineering is also involved in the main replacement and DSIC program and the decision making associated with this. In that regard, a worksheet has been developed to assist in water main replacement decisions. This tool scores candidate mains and assists in prioritizing replacement projects.

Consultants are engaged to prepare surveys of the streets on which mains are to be replaced. An Aqua NJ Engineering Technician then designs each project in the Computer Aided Design (CAD) system. When mains are replaced, all the related services (the Aqua NJ owned portion to the curb), valves, and hydrants (all part of DSIC) are replaced as well.

The standard materials and design specifications are used for the main replacement program. Mains are replaced with cement lined ductile iron pipe. The water pressure in mains being replaced does not change. The replacement pipe may be larger to meet higher throughput needs but the water pressure stays the same.

Distribution System Improvement Charge Program

The Distribution System Improvement Charge (DSIC) program is an element of Aqua NJ's water main, hydrant, and service replacement program. It refers to a five percent water rate rider surcharge for which Aqua NJ can qualify if it meets the NJBPU DSIC requirements. Every six months, Aqua NJ applies for the five percent rider which it qualifies for after spending $2.8 million funded by base rates. This includes submitting to the NJBPU a "foundational filing" listing all planned DSIC projects. After spending the $2.8 million from base rates, the five percent DSIC surcharge then funds the next approximately $2.0 million of main, hydrant, and service replacements. The surcharge must be spent on additional main replacements. However, Aqua NJ typically spends more than the $2.8 million base spend plus the $2.0 million surcharge on main replacements each year.

Aqua NJ makes a DSIC filing every six months to the NJBPU on the DSIC program. Prioritization tools utilized for DSIC eligible assets are included in the Foundational Filing documents for consideration by the NJBPU. During the 12 months ending July 2017, Aqua NJ had $14.8 million in DSIC eligible main replacement investments that resulted in a DSIC rate recovery amount of $2.2 million.

During the next four years, Aqua NJ anticipates the following DSIC eligible spending.

Aqua NJ Planned DSIC Eligible Expenditures ($000)

	2018	2019	2020	2021	Four Year Total	Average
Planned DSIC Expenditures	13,850	6,500	7,495	13,015	40,860	10,215

Other Capital Projects

Well, pump, and water and wastewater treatment plant additions, expansions, replacements, and upgrades are designed by consulting engineers and constructed by contractors. Value engineers may be engaged to analyze designs to identify cost reductions and easier construction, operations, and maintenance. In the case of specialized treatment facilities, like iron removal, radium removal, and ultraviolet treatment, contractors may be used for operations and maintenance of the facilities as well.

Aqua NJ has had to install six radium removal treatment facilities in response to the 2003 change in the allowable limits (less than 5 picocuries and less than 15 gross alpha picocuries) on a four quarter rolling average. There are four radium removal units in the Central Division and two in the Southern Division. A contractor designed, installed, and operates the units.

An investment of approximately $10 million is being planned for iron manganese removal facilities in Aqua NJ's Eastern Division. Three new source wells are involved. Investments in an iron removal facility and a uranium removal facility in the Northern Division are also planned.

Contractor Utilization

Capital projects for Aqua NJ are completed by contractors. This begins with local or specialized national engineering firms performing the site analysis, design, and equipment specifications. The construction work is put out to bid to a list of qualified vendors. Work is normally placed with the lowest bidder. Occasionally, an engineering estimate is developed to compare bids against one another or similar previous projects are referenced to analyze differences in proposals. Design and construction contracts are managed by the State Engineer.

Capital Budget

The capital planning and budgeting process is coordinated through the Engineering and Environmental Affairs group in Aqua Services. Every year, the five-year capital budgets are updated, typically during the months of June and July. The Senior Vice President, Engineering and Environmental Affairs approves the five-year and one year capital budgets as submitted in their final form. Various challenge steps occur prior to assembling the final budget.

Typically, an engineering project will be evaluated based on the following criteria: installed capital cost, continuing maintenance/upkeep cost, and increase or decrease in operational work-hours for routine or emergency response. The annual revenue requirement to offset the cost of the project is calculated and compared between other available options. Engineering projects are compared to other proposed installations that meet the project needs versus the cost of maintaining status quo or the cost of purchasing water from an interconnected system, if available.

Aqua NJ's capital expenditures for the past five years are shown on the following table.

Aqua NJ Capital Expenditures ($000)

Metric	2012	2013	2014	2015	2016	Total	Average
Capital Expenditures	8,704	16,268	13,250	21,680	17,530	77,432	15,486

Aqua NJ's capital expenditures totaled over $77 million in the past five years, an average of $15.5 million per year. Aqua NJ has an authorized capital budget for 2017 of $22.6 million and a capital budget of approximately $27.0 million was proposed for 2018.

Details associated with the Aqua NJ capital budget, capital budgeting process, and capitalization are discussed in Chapter VI, Finance and Accounting.

WATER SYSTEM DESIGN AND MATERIALS STANDARDS

Each Aqua NJ Division maintains its specific Water Main Specifications Manual of water systems design and material standards. These are consistent from Division to Division

and are based on standards developed by the American Water Works Association (AWWA), the New Jersey Department of Environmental Protection (NJDEP), and the National Sanitation Foundation (NSF). The specifications pertain to the products to be utilized in water systems and the execution (installation and application) of those products. The manuals include material specifications for:

- Ductile Iron Pipe
- Fittings
- Accessories
- Valves
  - Gate Valves
  - Butterfly Valves
- Valve Boxes
- Flanged Adaptors
- Copper Tubing
- Corporation Stops
- Hydrants
- Curb Boxes
- Brass Goods
- Numerous other products

The design specifications include detailed standard drawings and instructions for various configurations commonly encountered in Aqua NJ water systems along with test procedures and acceptance criteria to be applied.

WASTEWATER COLLECTION DESIGN AND MATERIALS STANDARDS

For its wastewater systems, Aqua NJ maintains "Standard Specifications for Construction of Sanitary Sewers and Appurtenances" that apply to all Aqua NJ wastewater collection installations. These specifications are based on AWWA, American Society for Testing and Materials (ASTM), and Pennsylvania Department of Transportation (PennDOT) standards and are intended for the use of developers, their consultants, and contractors who engage in the construction of sanitary sewer extensions or sewerage facilities. The specifications stipulate the various roles and responsibilities of all parties involved, as well as products, work practices, installation procedures, quality checks, testing requirements, and documentation submittals. Detailed drawings and instructions for configurations likely to be utilized are included.

FINDINGS

1. Aqua NJ effectively manages its capital investment program.

Aqua NJ, with the support and assistance of Aqua Services, effectively identifies, designs, and constructs capital investment projects for the benefit of its customers.

2. Aqua NJ Divisions track and record main leaks using different methods.

The three individual Divisions track and record main leaks, each using its own methodology. These may be paper leak reports, notes on paper maps, or Excel

spreadsheets. The leak history is reported to the State Engineer on demand, usually once or twice per year for DSIC and main replacement prioritization.

RECOMMENDATION

1. **Aqua NJ should standardize the methodology for tracking and recording main leaks to enhance the input of information for main replacement prioritization. (See Finding 2)**

The main replacement selection and prioritization process could be improved and more informed decisions made if standardized information was submitted for consideration.

H. SYSTEM ACQUISITIONS

Aqua America is pursuing a strategy of water and wastewater systems acquisition within the eight states it operates, including New Jersey. Aqua America's statement in its 2016 SEC Form 10K expands on this plan.

> *Consistent with this strategy, Aqua America is focusing its acquisitions and resources in states where it has critical mass of operations in an effort to achieve economies of scale and increased efficiency.*

In executing this strategy, the Company goes on to describe the results it has yielded in the past three years.

> *During 2016, Aqua America completed 19 acquisitions, which, along with the organic growth in existing systems, represented 15,282 new customers. During 2015, Aqua America completed 16 acquisitions, which, along with the organic growth in existing systems, represented 17,747 new customers. During 2014, Aqua America completed 16 acquisitions, which, along with the organic growth in existing systems, represented 12,120 new customers.*

The President, Aqua NJ, serves as the principal business development representative in identifying and developing water and wastewater system acquisition opportunities.

The President is assisted in performing due diligence, analysis, and evaluation of proposed acquisitions by the Director, Corporate Engineering and members of his staff. A comprehensive due diligence procedure has been developed and is utilized for these evaluations. Due diligence topics and criteria considered and evaluated in water and wastewater system acquisitions are shown in the following table:

Water and Wastewater System Acquisitions Due Diligence Topics and Criteria

Water Systems	Wastewater Systems
➢ Source/capacity ➢ Existing contracts ➢ Compliance record/issues ➢ Water Quality ➢ Customer Records/Billing ➢ Distribution system condition ➢ Age ➢ Breaks history ➢ Storage capacity ➢ Fire protection	➢ Existing contracts ➢ SSOs ➢ Overflows ➢ Lift Stations ➢ SCADA systems ➢ Plant condition ➢ Capacity ➢ Permitting

There were no water or wastewater systems acquired by Aqua America in New Jersey in 2017.

FINDING

1. **From a financial and accounting perspective, the methodology and basis for Aqua NJ's recent system acquisitions are considered reasonable (see Chapter VI, Finance and Accounting); however, from an operating perspective, the acquisitions completed from 2012 to present have been impractical and the operation and maintenance of the acquired systems is inefficient.**

The tables below identify Aqua NJ's acquisitions, both water and wastewater, from 2012 to 2017.

Aqua NJ Water System Acquisitions (2012–2017)

System Name	Date Acquired	Division	Connections	Miles from Division HQ
Tranquility	Nov 2012	Northern	46	31
Walkill Water	Dec 2012	Northern	389	47
Summit Lake	Aug 2014	Northern	76	52
Seaview Harbor	Apr 2015	Southern	89	53
Byram	Jun 2016	Northern	153	42
Cliffside Park	Oct 2016	Northern	34	19

Aqua NJ Wastewater System Acquisitions (2012–2017)

System Name	Date Acquired	Division	Connections	Miles from Division HQ
Walkill Sewer	Dec 2012	Northern	389	47
Spartan Village	Oct 2014	Central	214	15
Oakwood Village	Dec 2016	Northern	35	29

Aqua NJ acquisitions since 2012 have totaled 787 water system connections and 638 wastewater system connections. This is an average addition of 131 water connections and 213 wastewater connections per system acquired.

Although the basis for these acquisitions may have been acceptable from a financial and accounting perspective, from a practical standpoint many are not. These acquired systems are inconveniently and inefficiently located; one as far as 53 miles from its Division office. As a group, these systems are located an average of over 37 miles from their respective Division offices making operation and maintenance activities at those locations inefficient due to difficult accessibility and excessive windshield time for employees.

As addressed in Chapter II, Executive Management, New Jersey laws and public policy encourage the acquisition of smaller water and wastewater systems by larger systems that have more scale and expertise. However, the efficiency of operations should also be an important consideration when Aqua NJ is considering the acquisition of remote, smaller systems.

RECOMMENDATION

1. **Aqua Services should consider inclusion of an accessibility factor in its due diligence evaluation checklist for the maintenance and operation of candidate acquisitions. (See Finding 1)**

Consideration of the practical aspects of maintenance and operation of candidate systems for acquisition, such as the inefficiencies in accessing remote system locations could result in more viable acquisitions.

I. PROCUREMENT, MATERIALS MANAGEMENT, AND TRANSPORTATION

The Procurement, Materials Management, and Transportation functions are managed by the Vice President, Fleet and Supply Chain Management in the Aqua Services organization. This position reports to the Senior Vice President and Chief Administrative Officer of Aqua Services and has five direct reports including the Manager, Procurement; Metrology Manager; Manager, Materials Management; Manager, Fleet Maintenance and Compliance; and Lead Fleet Administrator. The Metrology Manager's responsibilities are discussed in Chapter IV, Customer Service. The organization structure is shown in the following exhibit.

Procurement, Materials Management, and Transportation Organization Structure

PROCUREMENT

The Manager, Procurement is responsible for all materials purchasing activities within the Aqua Services organization and some operational services contracting. The function is not responsible for professional services and construction contracting which is managed by the functional managers requiring the service contracts. For example, the Aqua NJ State Engineer is responsible for the capital program design and construction contracts. The Procurement function establishes company-wide materials contracts, such as for meters and pipe, through which Aqua NJ can order. It also processes individual Aqua NJ purchase orders for unique material needs.

The Manager, Procurement, has five direct reports: a Senior Purchasing Systems Analyst, two Senior Purchasing Agents, and two Seasonal Clerks, one of which is vacant.

Procurement Methods

The four means of procurement within the Aqua America organization are the Purchase Requisition/Purchase Order, Check Request, Procurement Card (P-Card), and the fleet fuel and maintenance card.

Purchase Requisitions/Purchase Orders. Purchase requisitions/purchase orders are the main means for procuring items exceeding $1,000. Requisitions are generated by the field organization and entered by the Division Administrative Aide in the general ledger system. Approvals are obtained locally, and then the requisition is forwarded to the Purchasing Department for processing into a purchase order. The purchase order is generated, then emailed to the vendor and the item is delivered. Following delivery, Accounts Payable requires a three-way match of the vendor invoice, the purchase order, and the receiving document to issue payment to the vendor for a transaction. Requisitions exceeding $15,000 require three bids. A Purchasing help desk is available to assist parties needing assistance with their purchases.

Check Requests. The second means of procurement is the check request for payment for services, taxes, and government fees. Actual examples include wireless telecom service payments, security services, municipal fees and taxes, and legal fees. The party responsible initiates the check request and obtains management approval. A check is then issued by Accounts Payable to pay for the service.

Procurement Cards. P-Cards represent the third means of procurement. The P-Card program is managed by the Aqua Services Assistant Controller. P-Cards are typically used for incidental expenses or non-stocked material purchasing. Generally, Superintendents and Managers have P-Cards for spot purchases. P-Card use and purchasing limits are approved by the next level of management. The P-Cards are a credit card provided by an area bank. P-Card users must be approved by the next level of management.

Fleet Fuel and Maintenance Cards. Aqua NJ employees' assigned vehicles are provided a fuel and maintenance card for vehicle operation. This program includes the purchase of fuel at approximately 170,000 stations and routine maintenance and repairs less than $500.

National Contracts

National contracts have been established by Procurement to achieve purchasing economies of scale. To accomplish this, Aqua Purchasing Agents worked with the state organizations to establish common goods and materials needs. Once these common needs were identified, national solicitations were issued, bids were received and evaluated, prices and quantities were negotiated, and awards made according the greatest benefit.

Multi-year bids are issued periodically for supply of all major components for the national contracts. Specifications are set by engineering, operations, and vendors that must be met by suppliers. Pipes, valves, and fittings are bid every three years. Due to market price fluctuations, copper products are bid every year and brass products every two years. There are national contracts for meters and meter testing and repair. The meter program is described further in Chapter IV, Customer Service.

Demand planning is used to optimally meet time of use. This entails developing forecasts of the levels of material usage during the year and providing this information to vendors to ensure material supplies will meet the timing of planned usage.

Pricing is “as delivered” with delivery location and time specified. This means that material handling and transportation to the Division headquarters or work sites are the vendors’ responsibilities. This is more efficient, minimizing material handling and inventory management activities by Aqua NJ personnel.

All contractors are vetted and have suitable insurance. There are presently no disputes with Aqua America vendors.

Sole Source Contracts

In some cases, where only a sole source supplier is available, an engineering opinion is needed to issue a sole source contract. Vendor materials and equipment prior performance is also checked before issuing a sole source contract.

Vendor Performance Reviews

Aqua Services policy requires the Procurement Department to periodically review each vendor from which Aqua America purchases inventory materials in excess of $25,000 annually. This is to be performed throughout the year as an ongoing process.

MATERIALS MANAGEMENT

Aqua Services Materials Management is led by the Manager, Materials Management who is an Aqua Pennsylvania employee. Materials Management is a centralized operation that operates three warehouses in Pennsylvania that are owned by the Aqua Pennsylvania organization.

Aqua NJ Warehouses

Aqua NJ, materials storage facilities are located at each Division office including the Eastern Division. These facilities and arrangements vary from Division to Division. This storage is mainly for high usage parts and materials that are charged when drawn from inventory.

In the Aqua NJ Northern Division, a building near the Division office serves as a garage and warehouse with various parts and materials in inventory. Various valves, piping, and pump parts are stored out in the yard along with approximately 20 spare hydrants.

In the Central Division, materials and parts such as piping and valves are stored in the warehouse at Hamilton. Additionally, the pump house at the base of the water tower serves as a parts storage facility with various parts on storage shelves. A tractor and backhoe used only for materials handling and a snow removal blade were also at this location.

In the Southern Division, a row of several shipping containers serves as the warehouse facility. Occasionally, DSIC materials (capital) are delivered to this facility. Various items are stored in the yard including a backhoe for material handling, valves of various sizes, hydrants, meter pits, and curb valves.

In the event that needed materials or parts are not on hand in the Aqua NJ warehouses, availability is checked with the Aqua Pennsylvania warehouses to obtain the needed item(s).

Vendors deliver directly to the work site for certain materials. For example, main replacement materials are usually delivered directly to the work site.

Materials Management Information System

Materials Management utilizes the inventory, requisition, and purchasing modules of the general ledger system to support materials management activities. Additionally, the general ledger system is used to charge inventory transactions, to post variances from standard cost of an inventory item to the purchase order price (when they are different), and to temporarily hold inventory items transferred from one company to another.

Inventory Management

Materials Management has developed policy and procedural guidance for inventory management activities. The document, “Inventory Control Policy and Procedures,” covers the policies, procedures, and systems that handle inventory, purchasing, locations, product management, receipts, maintenance, item costing, adjustments, pricing, accounting, reorder point calculations, physical inventory processing/counting, reporting, and history. Specific guidance is provided on the following:

- Security
- General ledger considerations for inventory
- Purchasing inventory
- Receiving inventory
- Inventory valuation
- Inventory turnover
- Physical inventory
- Inventory setup
- Inventory relief
- Inventory returns

The policy and procedures manual also provides specific general ledger system user guidance for the various processes and activities that must be performed to manage inventory effectively. These include computer screenshots to guide the user in essentially all processes necessary to manage inventory.

In the event needed parts or materials are not in stock, Aqua NJ employees contact Aqua Pennsylvania or the vendor concerned to obtain the needed item(s).

TRANSPORATION

The transportation function is led by the Manager, Fleet Maintenance and Compliance, and the Lead Fleet Administrator who reside in the Aqua Pennsylvania organization. Transportation is a centralized service that operates from facilities in Pennsylvania. Fleet management includes vehicle acquisition, major vehicle maintenance, investigation of all vehicle accidents, and management of vehicle accident claims. Aqua Pennsylvania has six fleet technicians at its Springfield and Willow Grove facilities in Pennsylvania.

Aqua NJ Vehicles

All Aqua NJ field employees have an assigned, company-provided vehicle. There are no specialty vehicles in New Jersey, only pick-up trucks that are easily maintained by a local garage or dealer. Aqua NJ vehicles are maintained locally for oil changes and other minor maintenance activities. A fuel card and maintenance card are provided for vehicle operation. Larger maintenance activities and body work are performed by the Aqua Pennsylvania fleet repair facility. The Aqua Pennsylvania Fleet function provides loaner vehicles, as needed. Only expenses for actual Pennsylvania garage time expended on Aqua NJ vehicles are charged back to Aqua NJ.

Vehicle Acquisition

Annual vehicle procurement begins with Aqua state organizations, including Aqua NJ, providing their anticipated vehicle needs to the central Fleet organization. Autos and light trucks are generally replaced at 150,000 miles or seven years' service. Heavy trucks and digger derricks are replaced at ten years' age but Aqua NJ has none of these. The maintenance record is also referenced along with the fuel card for historical problems or lack thereof to adjust the replacement for a specific vehicle. Aqua America typically procures General Motors, Dodge, and Freightliner equipment. Prices are checked every five years among the domestic manufacturers and any manufacturer incentives offered are checked annually.

Vehicle Maintenance

Aqua NJ is served by a national fleet maintenance administrator that is managed by Aqua Services. This program provides fuel availability at 170,000 gas stations and routine maintenance and repairs at local service stations and automotive repair shops. Aqua NJ employees who are assigned vehicles are individually responsible for ensuring their vehicles receive required maintenance such as oil changes, fluid checks, and tire rotations at one of the authorized fleet maintenance provider's participating facilities. Repairs estimated at greater than $500 require approval from the service provider's call center. Larger maintenance activities and some minor body work are performed by the Aqua Pennsylvania fleet repair facility. Major body work is outsourced. The Aqua

Pennsylvania fleet facility provides loaned vehicles to Aqua NJ vehicle operators as needed during repairs.

Vehicle Damage

Aqua self-insures its vehicles up to $100,000 for collisions. Damages to other vehicles claimed by others are handled by corporate claims management. Accident reports are reviewed by Aqua NJ and the Aqua Services Claims Department and Legal Department who evaluate the accident and responsibilities. Points are assigned to delinquent drivers as appropriate and computer based driver training is provided as necessary.

Vehicle Disposition

Vehicle resale and disposal are accomplished centrally through various auction houses, primarily at Belmar, NJ. Approximately 220 Aqua America vehicles are sold annually. Aqua America also has a program to sell vehicles to employees at national appraisal services prices. This is referred to as the "sole driver" concept. For example, an employee who has been assigned a specific vehicle for several years may have an interest in personally purchasing that vehicle once it has reached its replacement age or mileage, knowing the care and use it has received.

FINDINGS

1. Since 2013, Procurement has initiated several improvements in purchasing practices and strategies.

These improvements include establishing spend limits, setting up purchasing policies and procedures for central procurement, monitoring spend, and maintaining a purchasing help desk to assist requisition and purchase order writers and users. Additionally, Procurement established strategic suppliers for the company by leveraging the company's size. This involves pricing agreements with Aqua America volume commitments.

Another purchasing improvement was the development of the Item Master which is a catalog of specific items and services to be contracted. This was used to establish prices and volumes for buying agreements. The Item Master is imbedded in the general ledger system and can be searched for needed items.

2. Insufficient checks and balances exist in engineering, construction, and emergency services contracting.

The Aqua Services Procurement Department has no services contracting expertise on staff and is not involved in engineering or construction contracting. Both Aqua NJ and Corporate engineering manages these types of contracts with no involvement from Procurement.

Contracting for Aqua NJ engineering, construction, and emergency services appears to be exclusively under the purview of corporate engineering and the State Engineer without the involvement of others. In this regard, engineering:

- Maintains lists of qualified vendors
- Prepares bid specifications
- Issues bid packages

- Receives bids
- Evaluates bids
- Awards contracts
- Oversees contract work or hires inspection services
- Receives contractor invoices
- Reviews and approves contractor invoices for payment

Although there is no evidence of malfeasance, and none is suggested, the present process could readily present an opportunity for it and leaves Aqua NJ vulnerable to it.

3. Aqua NJ management has established a set of practical, no-nonsense policies for general company vehicle operation, maintenance, and use.

This policy sets forth the employee-operator's responsibilities for operating company vehicles and covers such topics as driver safety, licensing, vehicle maintenance, cell phone use and several other vehicle operating requirements.

RECOMMENDATON

1. Aqua Services should review and strengthen its engineering and construction contracting process to include more checks and balances to avert any potential malfeasance. (See Finding 2)

Strengthening the contracting process might include involving Procurement Department personnel, inserting verification check points in the process, and/or contract auditing enhancements.

J. OPERATIONAL SECURITY

PHYSICAL SECURITY

From a physical security perspective, all Aqua NJ water and most wastewater system buildings and fixed site facilities are fenced, locked, and alarmed. All gates for fenced areas are padlocked. The installed alarm systems interface with the SCADA systems and will alert Division personnel of any alarms.

Although police patrols of Aqua NJ facilities are not routinely conducted, when requested by Aqua NJ, the police will initiate patrols of specific facilities for a specific purpose for a limited time.

CYBERSECURITY

As far as installed cybersecurity measures are concerned, the SCADA system is isolated from the internet with dedicated communications connections to the Division SCADA control centers.

Effective in March 2016, the NJBPU imposed new cybersecurity requirements to significantly enhance the cybersecurity associated with SCADA systems of New Jersey utilities. These requirements included the following actions:

- Development of a cybersecurity Incident Response Plan
- Completing a cybersecurity Risk Assessment (with prioritized risks)

- Communications to Aqua NJ employees regarding cybersecurity threats
- Registration with the Cyber Communications Integration Cell Group (CCICG) (a State of New Jersey sponsored cybersecurity organization)

The enhanced New Jersey requirements prompted Aqua Services to respond with an Aqua America-wide cybersecurity initiative. And, as New Jersey's cybersecurity requirements are the most stringent of the states in which Aqua operates, Aqua NJ was assigned as the lead operating company for this initiative.

A cross-functional work group was formed to address the Aqua NJ requirements. The work group consists of Director of Information Security serving as Chairperson, the Director of Corporate Engineering, Aqua NJ operations personnel, a process control engineer, information security specialists, a SCADA specialist, a network engineer, and the Information Technology Service Desk Supervisor. The President, Aqua NJ, also participates in the work group meetings.

To fulfill the NJBPU requirements, the following actions were undertaken:

- The Cybersecurity Incident Response Plan was updated for the New Jersey requirements and a specific New Jersey cyber response was added. This included identification of specific stakeholders and classification of cyber incidents by severity as well as adding more cybersecurity-specific language in the Plan.
- An assessment of Aqua NJ cyber risks was conducted. This involved completing an inventory of systems and hardware including laptops, desktop computers, servers, SCADA systems, and some communications systems. Assessments were performed of individual component risks from the perspective of access, maintenance, operations, and processes. Vulnerabilities were identified and solutions were developed.
- Cybersecurity threat awareness communications were upgraded. A targeted educational program to enhance Aqua NJ employee awareness of cybersecurity threats was initiated. The program includes information on phishing and other means of gaining unauthorized system access by cyber intruders. This education program is focused on all of Aqua America. Additionally, threat intelligence is being obtained from several sources including customers and suppliers.
- Registration with CCICG has been accomplished and Aqua NJ is a regular participant in the Group's activities.

Some of the specific solutions developed for Aqua NJ were to: (1) provide enhanced security laptops and password encryption for SCADA system access and remote access to the Aqua network; (2) perform an assessment of contract service providers and recurring annual assessments; and (3) replace SCADA computers in Division offices with more secure units.

At the time of the onsite audit visit, new laptops were being distributed as part of the Aqua NJ upgrade initiative. It was anticipated that the laptop devices would be issued to Superintendents, Foremen, and Operators in each Division. The SCADA computers

for each Division were expected to be replaced with more modern controls by yearend 2017 to ensure compliance with the NJBPU regulation.

FINDINGS

1. **Aqua NJ's security performance has been strong with no reportable events during the 2012 to 2017 timeframe.**

Aqua NJ reported that it has had no reportable security events in the past five years.

2. **Aqua NJ has taken effective measures to meet NJBPU's new cybersecurity requirements.**

The Aqua Services Information Security group has provided strong support to Aqua NJ in the planning, coordination and execution of the initiative to achieve the enhanced level of water system cybersecurity required by the NJBPU.

IV. CUSTOMER SERVICE

This chapter addresses the Aqua New Jersey, Inc. (Aqua NJ) customer services including a special study comparing Aqua NJ's non-revenue water to other New Jersey water utilities. The chapter is organized as follows:

A. Overview
B. Metering and Meter Reading
C. Billing and Payments
D. Credit and Collections
E. Call Center Operations
F. Complaints
G. Revenue Protection
H. Communications and Conservation
I. Performance Management
J. Non-Revenue Water Comparison

Background, Findings, and Recommendations are presented in each of the sections after the Overview.

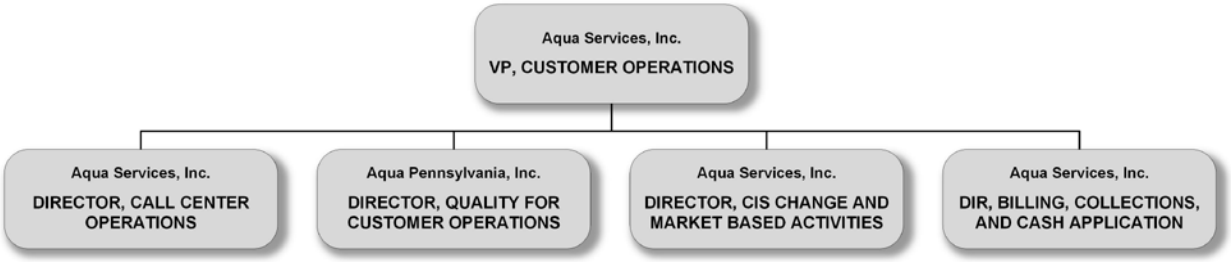
A. OVERVIEW

Most Aqua NJ customer services are provided by Aqua NJ's affiliate, the Aqua Services Company (Aqua Services). The Aqua Services Customer Operations (referred to as Aqua Customer Operations – ACO) group provides billing and payments, credit and collections, call center operations, complaint handling, revenue protection, and communications services. The customer services provided directly by Aqua NJ are ones requiring a physical presence in the service territory: the installation, maintenance, and replacement of meters; meter reading; and customer field service. The customer services provided directly by Aqua NJ are also addressed in Chapter III, System Operations.

Aqua Services Customer Operations Organization and Staffing

The current ACO Vice President (ACO VP) was recruited in September of 2017 and reports to the Senior Vice President and Chief Administrative Officer (CAO). The CAO reports to the Executive Vice President and Chief Financial Officer (CFO) who, in turn, reports to the President and Chief Executive Officer (CEO). Thus, the ACO VP is three organizational levels below the CEO (CEO to CFO to CAO to VP ACO). As a result, there are three additional organizational levels responsible for and overseeing the Customer Service function. The ACO VP has four direct reports: (1) Director, Call Center Operations; (2) Director, Quality for Customer Operations; (3) Director, Customer Information System (CIS) Change and Market Based Activities; and (4) Director, Billing, Collections, and Cash Applications. The organization chart is shown below.

Aqua Customer Operations Organization Structure



Call Center Operations comprises the two ACO call centers, one located in Kankakee, Illinois and the other in Cary, North Carolina. The call centers receive calls from customers and the Customer Service Representatives (CSRs) resolve the call transactions.

The Quality for Customer Operations unit is primarily responsible for the sampling of recorded CSR calls, assessing the CSRs' quality performance, and providing feedback to the CSRs and their supervisors. This unit also includes the Regional Customer Care Team Leads for each state who coordinate with their respective State Field Operations personnel, including Aqua NJ.

The Regional Customer Care Lead for Aqua NJ has the following responsibilities:

- Act as a primary contact within ACO and as a liaison for Aqua NJ
- Provide direct support to the core business units within Aqua NJ
- Execute regular operation of account updates and customer research to maintain compliance with service standards and state regulation
- Ensure specific state operational policies, procedures, and functions are documented, publicly stored, regularly updated, and communicated as needed
- Manage and execute ACO responsibilities while accomplishing objectives in addition to attaining performance metrics
- Coordinate the response to customer complaints to the New Jersey Board of Public Utilities (NJBPU)

The Customer Information System Change and Market Based Activities group coordinates modifications to the customer information system (CIS) and manages billing and other services that are sold to non-Aqua America municipal water and waste water utilities.

The Billing, Collections, and Cash Applications unit manages the billing process, the receipt of customer payments, and the collections process for overdue bill payments. This group also manages the contractors that are used in these processes.

Recent employee staffing levels for the four ACO units are shown below:

ACO Staffing Levels

Organizational Unit	July 2017
Call Center Operations	67
Quality for Customer Operations	28
CIS Change and Market Based Activities	8
Billing, Collections, and Cash Applications	18
Total	**121**

Call Center Operations accounted for 55% of the ACO headcount. Aqua Services did not provide the requested headcounts for 2016 and earlier.

ACO Performance Management

State Level. The monthly Scorecard is the primary tracking system for operational level performance and there is a Scorecard for each of Aqua America's eight state operations, including Aqua NJ. The 2017 Aqua NJ Scorecard has five categories: (1) Fiscal Responsibility, (2) Operations Management, (3) Customer Operations, (4) Meter Operations, and (5) Environmental Compliance. Metrics are shown for some of these categories for each of the Aqua NJ President, the three Superintendents, the Manager of Water Quality and Wastewater, and the Operations Support Coordinator. The data includes the metric weight, target, actual, and score. The Scorecard includes the percentage of incentive compensation allocated to the Scorecard for each of the employees. If available, the previous year's results are shown and there are several American Water Works Association (AWWA) benchmark metrics. The 2017 Scorecard was modified compared to 2016 and earlier to include new metrics, elimination of some metrics, and reformatting.

The Customer Operations section of the 2017 Aqua NJ Scorecard contains four metrics:

- Service Orders (SOs) Aged Over Seven Days
- Percent of Total Accounts Receivable (AR) Aged Over Ninety Days
- Percent of Bad Debt to Total Revenue
- Number of PUC (New Jersey Board of Public Utilities) Complaints per 10,000 Accounts

These metrics are described in the relevant Findings sections of this chapter, including: C. Billing and Payments, D. Credit and Collections, and F. Complaints.

ACO Level. The ACO VP's 2017 goals include meeting and/or exceeding the year-to-date Call Center Aggregate Service Level of 82% (percent calls answered in 90 seconds) and year-to-date CSR Abandonment Rate of five percent. The ACO VP now uses a business intelligence dashboard tool to display these two and other performance metrics and activity counts. These same metrics and goals are included in the VP's incentive compensation package. Metrics and targets/goals for 2018 were not yet developed at the time of the SAGE Audit.

ACO Capital Budget

The ACO multi-year capital budget allocated to Aqua NJ is shown below.

Aqua NJ ACO-Related Capital Spending

Area	2013	2014	2015	2016	Year-to-Date July 2017
Customer Service and Customer Operations Technology System Enhancements	$243,793	$144,597	$177,483	$361,302	$80,256

The allocated amounts are largely related to Aqua Services Information Technology (IT) costs for the CIS projects and modifications.

The Aqua NJ ACO-related Operations and Maintenance (O&M) spending is shown and discussed in Section I, Performance Management in this chapter.

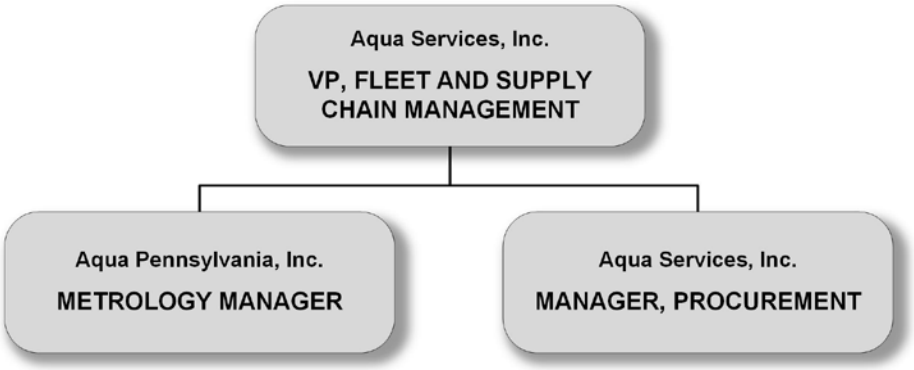
B. METERING AND METER READING

BACKGROUND

Only water services within Aqua NJ are metered. Wastewater service billings are charged at a flat rate. The Aqua Services Supply Chain Management Group includes the national meter standards and procurement functions. Aqua NJ follows the national standards and utilizes the national contracts for meter supplies.

The Vice President of Fleet and Supply Chain Management, reports to the CAO, as does the ACO VP, and has two meter-related direct reports: Metrology Manager and Manager of Procurement, as shown in the following exhibit:

Supply Chain Management Organization Structure



Housed within this organization are the national meter management functions, including contracting and procurement. The Metrology Manager manages the national standards for meter selection, installation standards, meter configuration, and meter retirements. The Manager of Procurement is responsible for meter contracting and vendor management and for coordinating the national cyclical meter reading on a daily basis.

The day-to-day meter installation, maintenance, replacement and reading functions are done by Aqua NJ personnel. For Aqua NJ, the three Division Superintendents (one Superintendent manages two divisions) manage field operations, including meter

operations and meter reading for the four divisions. For more information on these functions, please see Chapter III, System Operations.

Aqua NJ's meter operations services approximately 52,000 metered services. Meter exchanges are performed to comply with regulatory meter testing regulations and to service noisy, stuck, and otherwise impaired meters. Additionally, new meters are installed for growth within the system.

Meter Purchasing and Inventory

Aqua Services Procurement manages the national meter vendor contracting process. National vendor contracts are maintained and there are two vendors who are supplying new meters. A third vendor supplies the Encoder Receiver Transponder (ERT) device that is configured to fit all meters and enables automated meter reading.

Aqua NJ is responsible for ordering meters on the national contracts and orders are placed through a purchase order process. Upon delivery, a three-way match is done to compare purchase order, invoice, and shipping documentation, after which vendor payment is approved.

Meter data is housed in the CIS. The data include: meter type; status; manufacturer; meter-specific identification; original install, retired, and transponder ID; customer information; asset codes; purchase date; price; and other necessary information.

Meters are added to the CIS when requested by the state and are entered by the Aqua Services Metrology function. There are three primary stages of a meter's life cycle: in stock, installed on service, and retired. Meters will return to "in stock" or be "retired" depending on the result of meter testing. Physical inventory counts are performed periodically and adjustments are made as needed in the CIS which feeds the data to the Aqua America financial records system (which includes general ledger, accounts payable, accounts receivable, and reporting) for maintenance of meter inventory.

Recent data for the numbers of installed meters for Aqua NJ's four Divisions are 49,406 inside meters and 5,104 pit or vault outside meters, for a total of 54,510 meters.

Meter Reading Procedures

Aqua NJ metered services are allocated into 21 billing cycles and 49 meter reading routes. The 49 routes are scheduled to read each month into the CIS system. The meter reading schedule is prepared annually and reviewed to ensure compliance with days of services standards and holiday considerations. Each reading route rolls into one cycle and each cycle bills 12 times annually with a monthly days of service window between 26 and 35 days.

All meters are configured using a Radio Frequency (RF) meter reading system, using the ERTs and readings are collected into the Field Collection System (FCS) by driving the meter reading route. The FCS downloads reading assignments, collects daily reads, and uploads reading and consumption data into the CIS.

Meter Testing

The NJBPU meter testing requirements for Aqua NJ are:

- 5/8-inch meters – ten years

- 3/4-inch meters – eight years
- 1-inch meters – six years
- 1.5-inch and larger meters – four years

Aqua NJ submits meter quarterly testing results for each of the four Divisions to the NJBPU. The testing is done for all of the states by a contractor located in New Jersey.

Meter history is retained in the CIS system which includes the current installation date (when placed in service at current property) and the original meter installation date (the date a meter was first placed in service).

The Metrology Manager uses the CIS meter history to forecast and target which meters will reach their statutory testing age during the current year. Work orders and required mail files are compiled for each customer impacted and the process of notification and appointment scheduling is executed according to the master testing schedule.

FINDINGS

1. Aqua NJ meter reading performance has been generally good, either meeting or exceeding its targets.

There are two Aqua NJ performance reports that have metrics for meter reading-related functions and activities. The first is the Metering Operations section of the Aqua NJ Scorecard and the second is the Aqua NJ State Opportunities Meeting ACO Report.

The following table shows available reported Metering Operations data for the Aqua NJ Scorecard from 2012 through June of 2017:

Aqua NJ Metering Operations Scorecard Metrics Tracked in 2017

Metric	2012	2013	2014	2015	2016	June 2017
Overall Estimate Rate	0.30%	NA	0.20%	0.10%	0.22%	0.22%
Accounts Estimated > 90 Days	0.03%	NA	0.01%	0.01%	0.03%	0.01%
Total Meters Replaced	4447	NA	5,198	4,614	5,326	2,906
Zero Consumption (discontinued in 2017)	0.38%	NA	0.03%	0.06%	0.11%	NA
Number of Critical Zero Consumption Service Orders per 10,000 Accounts (added in 2017)	NA	NA	NA	NA	NA	1
Read Rate of Metered Accounts	100%	NA	99.9%	100%	99.9%	99.9%

The 2017 Aqua NJ Scorecard reflects discontinued and new metrics, compared to previous years. Pre-2107 Scorecard metrics were not consistently maintained and no metrics were reported for 2013.

There are four metrics that have been consistently reported since 2014. Three of the four are performance measures: Overall Estimate Rate, Accounts Estimated Greater than 90 Days, and Read Rate of Metered Accounts. The fourth metric is the Total

Meters Replaced where the annual numbers vary significantly, but the metric is not a performance measure since it has no associated targets or goals. It is only a work activity count.

The meter reading performance metrics are acceptable for a utility with automated meter reading:

- Overall Estimate Rate recently has been about 0.22%
- Accounts Estimated > 90 Days is at about 0.01%
- Read Rate of Metered Accounts has been 99.0% or higher

ACO has said that Aqua NJ has met or done better than its Overall Estimate Rate objective of 0.05% in 23 of the last 24 months. For Aqua NJ, the Accounts Estimated > 90 Days equates to 26 of the approximately 52,000 active customers and this metric has met or exceeded its objective of 0.01% in each of the last 24 months.

The second metering-related performance report is part of the "Aqua NJ State Opportunities Meeting ACO Report." The July 2017 Report includes:

- "Estimate Rate" (defined as bills based on estimated reads) for each of Aqua NJ's four Divisions. There are counts for each Division, including active reads and missed reads. The state-wide target was 0.50%. Actual rates for the four Divisions varied between 0.14% and 0.28%, with a state-wide actual of 0.21%.
- "90 Days Without an Actual Read" (of active meters) for each of Aqua NJ's four Divisions. The state-wide target was 0.05%. Actual reads for the four Divisions varied between 0.00% and 0.02%, with a State-wide actual of 0.01%.
- "Read Rate of Metered Accounts" for the four Divisions. The state-wide target was 99.0%. All four Divisions had rates of 99.0%, with a state-wide actual of 100.0%.
- "Critical Zeros Per 10,000 Reads" ("critical zeros" is defined as most likely correctible and high priority zero consumption reads compared to total zero consumption reads) for the four Divisions. The State-wide target was 50. Actual metrics among the four Divisions varied between zero and 14, with a State-wide actual of five.

For the four metrics, Aqua NJ performed better than the targets.

2. Several of the Aqua NJ metering metrics have no performance measurement value.

The Total Meters Replaced metric as a stand-alone work activity count that is not useful for tracking performance. There are no planned versus actual ratio metrics that would be indicative of either meeting NJBPU regulatory requirements or assessing Aqua NJ meter failures or other problems that could point toward improvement opportunities. Better metrics would be percent of meters tested on time and percent of meters tested that failed the test.

The Inactive Sewer Only Accounts and the Inactive Water Accounts metrics have not been included in the Scorecards since before 2012. These are also just counts and would have no performance management value if reported as described. Scheduling

periodic investigations of inactive accounts and reporting on the results may be a better practice and may discover instances of theft-of-service.

3. **Aqua Services Supply Chain Management has a comprehensive, well-defined, and well-documented process for purchasing meters.**

The "Aqua Meters/ERT Purchasing Policies & Procedures" document describes: meter purchasing policies, meter roles and responsibilities, the meter needs analysis procedure, identifying meters available for purchase, and receipt of meters procedures. The roles and responsibilities are particularly explicit with respect to the participating groups: national Meter Operations, Procurement, contracts (decision-makers), meters requestors (the states), and the vendors. For each of the 33 tasks, each involved group or person is designated as: Responsible (does the work), Accountable (ownership), Consultant (provides input), or Informed (receives communications).

RECOMMENDATION

1. **Remove or replace irrelevant or inadequate metrics from Aqua NJ monthly performance reporting and add more relevant metrics. (See Finding 2)**

The Total Meters Replaced, Inactive Sewer Only Accounts, and the Inactive Water Accounts metrics that are included in the Aqua NJ Scorecard are either irrelevant or inadequate as performance metrics. They should be removed from the reports and, if the topics are addressed, replaced with more appropriate performance metrics, such as percent of meters tested on schedule, percent of meter test failures, and theft of service discovered.

C. BILLING AND PAYMENTS

BACKGROUND

Billing

Files containing billing cycles are uploaded into the CIS and Aqua Meter Reading Application (AMRA) through the Aqua Cash Meter Interface (ACMI) program. AMRA stores the raw meter reading information while the CIS stores the reads used for billing based on the number of gallons measure. ACMI provides the billing department with a file that is uploaded into the CIS and includes the days of service, any missed reads, and any exceptions associated with the cycle.

The days of service within the cycle are reviewed to ensure that the cycle meets the 26–35 days of service standard for a monthly cycle. Exceptions such as a high read are reviewed and processed. The number of missing reads is reviewed to ensure that the cycle was fully read. If there are any issues along the way, the Aqua NJ Regional Customer Care Lead is asked for additional information or Meter Operations is contacted to reprocess/re-upload the file.

Each billing cycle is scheduled for "charging" (the application of service rates and non-service rates) and billing (the creation of the bill-print file). A bill print file is created and sent to the bill print vendor. Bills are printed and sent via the United States Postal Service (USPS). Customers have 22 days from the bill date to pay the bill.

Payments

Customers can make payments through a variety of methods:

- Lockbox (pay by mail) – Customers can mail payments to a post office box and the payments are handled by the lockbox vendor bank.
- Zipcheck – This is a direct-payment plan that automatically deducts the exact amount of the bill from the customer's checking account on the due date. The customer includes a voided check with a written application to enroll.
- WaterSmart (Aqua OnLine) – This is an electronic billing paperless payment arrangement. The customer is notified of the bill via email and the customer can view the bill on-line and ask questions if necessary. Customers agree to have the billed amount debited from their bank account by the Aqua OnLine Bill Payment Service on the due date. (Aqua OnLine is a trademarked name managed by the contract billing vendor.)
- Speedpay – The customer can pay by phone using a credit card or by check by calling a toll-free number. The customer can also pay using Speedpay online. Each transaction incurs a $2.25 fee. If a customer is paying by Speedpay after receiving a shutoff notice and is at risk of being disconnected, the customer must also call the call center with a confirmation number to avoid disconnection.
- Western Union (pay in person) – Payments can be made by customers at numerous locations throughout the service territories via Western Union. These locations include supermarkets, convenience stores, pharmacies, check cashing vendors, gasoline stations, and other venues.

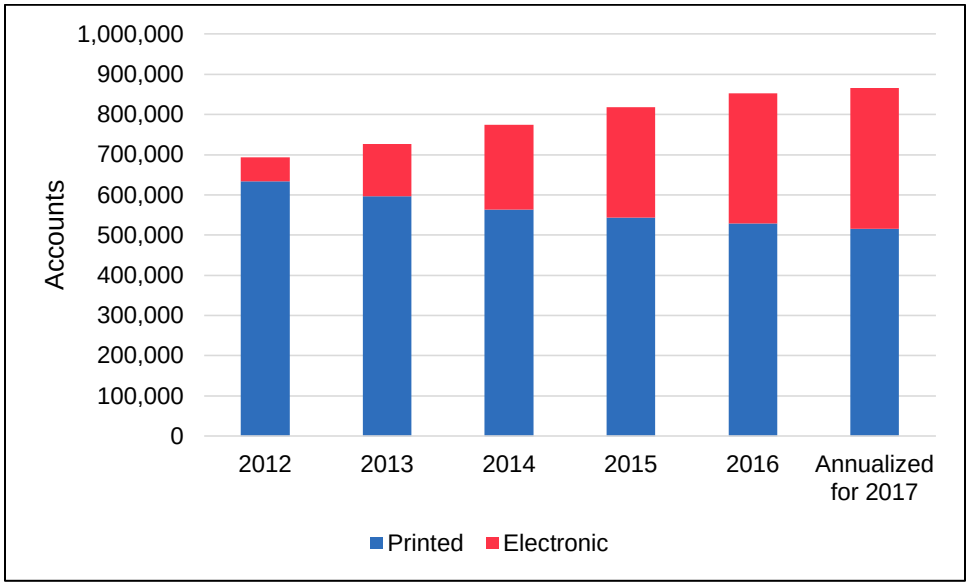
ACO receives a file from each of its payment vendors around 3:00 PM Eastern each day. As long as a customer has made a payment prior to 2:00 PM Eastern that day, ACO will receive the payment and it will be applied to the account that evening prior to the charging and billing of accounts.

FINDINGS

1. **Aqua NJ customer electronic bills are increasing and printed bills are decreasing, driving down processing costs.**

The graph and table below show the Aqua NJ bills by type:

Aqua NJ Bills by Type



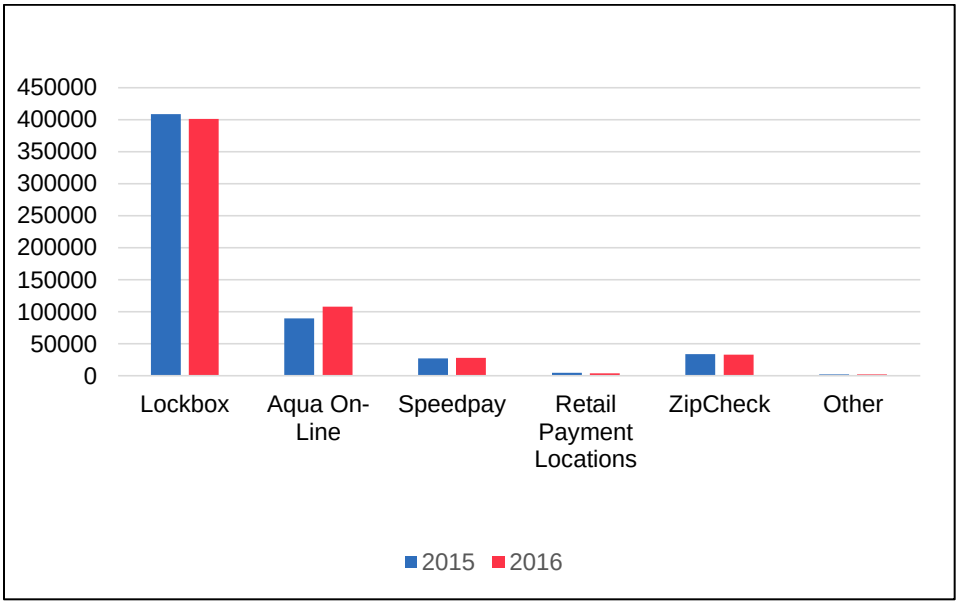
Type	2012	2013	2014	2015	2016	2017 Annualized
Printed	634,045	596,196	562,944	544,084	529,053	515,085
Percent Printed	91%	82%	73%	66%	62%	60%
Electronic	59,847	130,413	210,813	273,733	323,924	350,595
Percent Electronic	9%	18%	27%	34%	38%	40%
Total Bills	**693,892**	**726,609**	**773,757**	**817,817**	**852,977**	**865,680**

The graph portrays an increase in the number of electronic bills and a higher percentage compared to total bills. The annualized 2017 data is based on reported payment types through July 2017. Increasing paperless billing will drive down print-related costs. Electronic billing has increased by about 486%, nearly five times, from 2012 through 2017 (annualized) and represents 40% of total billing.

2. **Aqua NJ bill payments transacted online have increased in 2016 over 2015, driving down processing costs.**

The graph and table below illustrate the number of transactions occurring in the payment types for 2015 and 2016:

Aqua NJ Payment Transactions by Types



Type	2015	2016
Mail Lockbox	408,403	400,997
Aqua OnLine	89,870	107,771
SpeedPay	26,873	27,751
Retail Payment Locations	4,329	4,074
ZipCheck	34,006	32,678
Other	2,142	2,170
Total	**565,623**	**575,441**

Between 2015 and 2016, Aqua NJ bill payments increased by 19.9% via Aqua OnLine and decreased by 1.8% via the Lockbox. The data indicates that a significant portion of the online payments' increase may have come from new accounts.

3. ACO can improve the customer experience and reduce costs by moving the Zipcheck enrollment process online.

The current Zipcheck process requires a customer to send in an application with a voided check. The application is processed and the customer is enrolled in the Zipcheck direct debit program. ACO has said that, "in the future, we may look to bring this functionality online to our website to allow customers to enroll themselves without having to mail in an application and send a voided check." This would encourage greater use of the likely lower cost Zipcheck payment option and reduce the cost of enrolment.

RECOMMENDATION

1. **Move forward with the development of moving Zipcheck enrollment on line. (See Finding 3)**

As Aqua services has acknowledged, moving the Zipcheck enrollment process to its online website is a convenience for customers, will improve the customer experience, and is likely to be a good opportunity for cost reduction.

D. CREDIT AND COLLECTIONS

BACKGROUND

The Supervisor of Credit and Collections reports to the ACO Director Billing, Collections, and Cash Application. The Supervisor manages two Revenue Recovery Specialists I, three Revenue Recovery Specialists II, one Accounts Receivable Assistant, and one Revenue Recovery Specialist II/Accounts Receivable Analyst.

ACO does not use credit checking agencies when customers sign up for service. There are no deposit requirements for Aqua NJ.

Shut-Off for Non-Payment Process

A customer has at least 22 days to pay a bill. If ACO does not receive a payment from a customer for the monthly bill, six days after the due date a penalty is applied to the account. The collections process begins when the bill payment is 30 days past due. If the customer's balance is still over the delinquency threshold, a ten-day reminder notice, with a proposed discontinuance/termination (shut-off) date, is mailed to the customer. Two days prior to the proposed shut-off date, two attempts are made to contact the customer by telephone. These calls are made by a contract vendor, which receives a file from ACO. If no contact, the vendor sends a file with the results of the calls to ACO for uploading into the CIS. If the customer has not made a payment by the date of discontinuance/termination shown on the shut-off notice, or if there is no current payment arrangement, a Shut off for Non-Payment (SONP) service order is created in the CIS and sent to Aqua NJ State Operations. Field Service Representatives (FSRs) are dispatched to cut off the customer’s service.

According to its tariff, Aqua NJ shall not discontinue residential service except between 8:00 AM and 4:00 PM, Monday through Thursday, unless there is a safety-related emergency.

Collection Agencies Process

A final bill is issued and after 60 days, twice a month, an automated process is run and the accounts that are ready for collections are sent to a collections placement vendor. The vendor's software allocates the accounts to the contract collection agencies based on a set of parameters determined by ACO. There are three primary agencies, two secondary agencies, and two tertiary agencies. A law firm is used for collections related to accounts that are part of estates in probate. These agencies cover all eight states. Most of the delinquent accounts are distributed to the three primary agencies.

FINDINGS

1. Aqua NJ has generally performed better than its targets, but performance trends have not improved significantly for two Credit and Collections metrics.

The following table is a compilation of Aqua NJ Scorecards for the last several years, showing the four metrics for Customer Operations on the 2017 Aqua NJ Scorecard.

Aqua NJ Customer Operations Scorecard Metrics Tracked in 2017

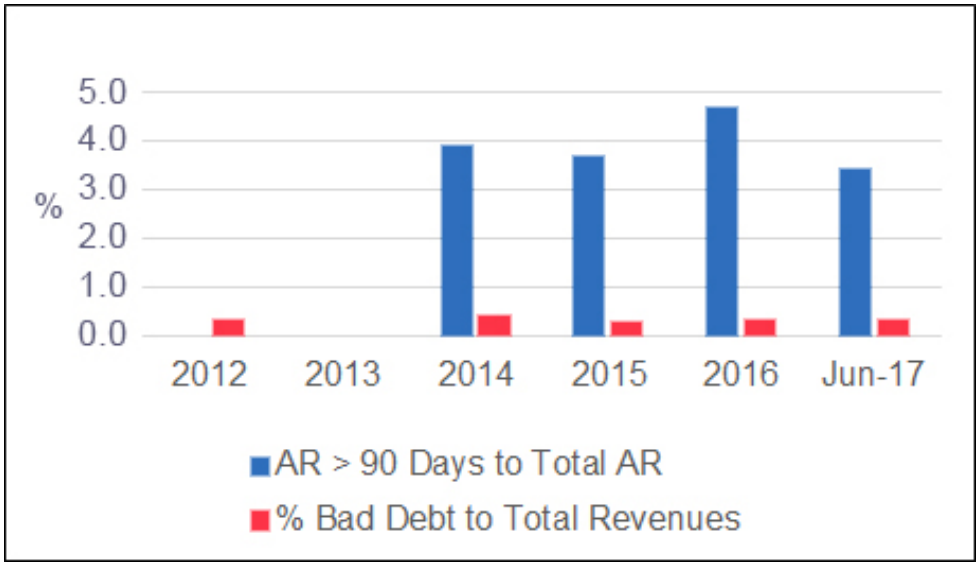
Metric	2012	2013	2014	2015	2016	June 2017
Number of Service Orders (SO) Aged > 7 Days Divided by 10,000 Accounts Priority 1 and 2 Aged SO > 7 Days	NA	NA	NA	NA	NA	1.0
Accounts Receivable (AR) > 90 Days to Total AR	NA	NA	3.9%	3.7%	4.7%	3.4%
Percent Bad Debt to Total Revenues	0.30%	NA	0.40%	0.28%	0.31%	0.30%
Number of PUC Complaints per 10,000 Accounts	NA	NA	NA	NA	NA	1

The metrics reflect the 2017 Scorecard which is a revision from previous years. A number of metrics were discontinued and do not appear on the 2017 Scorecard. New metrics were added and data for previous years are not available.

Two of four metrics have been somewhat consistently reported: (1) Accounts Receivable (AR) > 90 Days to Total AR and (2) Percent Bad Debt to Total Revenues. Both are relevant to the ACO collections functions. These two metrics represent ACO's management objectives for Credit and Collections performance and the metrics are useful for identifying revenue flow and recovery problems.

The graph and table below portray the two metrics to the extent that the metrics were reported in the 2012 through 2016 Year-To-Date (YTD) December and YTD June 2017 Aqua NJ Scorecards:

Aqua NJ Credit and Collections Scorecard Metrics



Metric	2012	2013	2014	2015	2016	June 2017
Accounts Receivable (AR) > 90 Days to Total AR	N/A	N/A	3.9%	3.7%	4.7%	3.4%
Percent Bad Debt to Total Revenues	0.30%	N/A	0.40%	0.28%	0.31%	0.30%

Accounts Receivable > 90 Days to Total Accounts Receivable spiked in 2016 and dropped in 2017, but there is insufficient data to suggest a trend. Percent Bad Debt to Total Revenues spiked in 2014, but the data does not suggest a trend. If anything, the data suggests that bad debt performance is stagnant: 2016 and 2017 are about the same as 2013.

The 2017 target for Accounts Receivable (AR) > 90 Days to Total AR was 5.0% and the target for Percent Bad Debt to Total Revenues was 0.50%. Although the targets have varied somewhat in previous years, Aqua NJ has generally performed better than its targets.

2. ACO lacks a number of collections agency metrics and lacks adequate reporting formats that would support performance improvement.

For each collection agency, ACO tracks by state:

- Number of allocated accounts
- Allocated dollars
- Percent volume of total allocated accounts
- Percent value
- Average balance
- Payments
- Liquidity percent (payments divided by allocated dollars)

These collection agency metrics are only displayed in table format, lack targets, and it is difficult to see patterns and trends that would highlight the level of performance and would therefore lead to performance improvement. Specifically, the ACO lacks report formats for performance reporting and improvement, such as monthly YTD and year-to-year graphs that display trends, with associated text commentary that explains variances between actuals and targets, and action items for follow up.

The performance of the vendor that handles collections with Interactive Voice Messaging (IVM), including auto-messaging and live outbound calls, is not included in the collection agency metrics table and is not tracked and reported.

RECOMMENDATION

1. **Implement additional ACO Credit and Collection metrics for better performance management. (See Finding 2)**

Additional metrics for overdue accounts receivable and collection agency performance will lead to improved performance, such as reducing overdue bill amounts and more timely and higher collection recoveries. With better vendor management and analysis, ACO can change allocation/placement among agencies, renegotiate agency contracts, eliminate poor performing agencies, or rebid the contracts.

Performance reporting should include monthly YTD and year-to-year graphs that display trends with associated text commentary that explains variances between actuals and targets, and action items for follow up.

Because Aqua NJ has generally performed better than its targets for Percent Accounts Receivable (AR) > 90 Days to Total AR and Percent Bad Debt to Total Revenue, ACO should consider making the targets more challenging to encourage more creative and aggressive actions to minimize the variances.

ACO should add collection agency and collection management metrics, such as:

- Recovery rate per placement and per dollars allocated, per agency
- Cost per dollar recovered, by agency
- Recovery dollars per customer account, per agency
- Recovery rate per customer account, per agency
- Residential active 60+ day overdue accounts receivable
- Cumulative accounts receivable reduction
- Residential overdue to a rolling 12-month revenue ratio (accounts receivable)
- Rolling 12-month write-off to rolling 12-month revenue ratio
- Net write-offs per customer
- Average residential active overdue per customer
- Cost per overdue customer

ACO should also add performance metrics for the vendor that handles collections with IVM for tracking, analysis, and reporting.

E. CALL CENTER OPERATIONS

BACKGROUND

There are two ACO call centers, one in Kankakee, Illinois and one in Cary, North Carolina. Both call centers take Aqua NJ calls based on customer service representative (CSR) availability.

In 2016, ACO consolidated its previously three call centers into two. The former call center in Bryn Mawr no longer takes real-time calls but still includes the Regional Customer Care Team Leads who coordinate with the State Operations personnel and handle escalated executive level complaints and escalated commission complaints, as discussed in the Overview section above.

Call Center Staffing

The call centers had 67 staff as of July 2017. Some CSRs have been with ACO as long as 11 to 12 years. The average CSR tenure is three to four years. The hours of employment are 8:00 AM to 5:00 PM.

After-Hours Contractor Call Center

After 5:00 PM, ACO uses its after-hours call center vendor. The vendor CSRs have read-only CIS screens. They send emails to Aqua for CIS updates and must phone Division State Operations to handle emergencies such as leaks and outages.

New Customer Service Representative Training

All new CSR hires undergo a formal training program that lasts 12 weeks. The training is a mix of classroom training (including quizzes, tests, and homework), listening to calls handled by an experienced CSR, participating in mock calls to test different scenarios, and taking live calls followed by debriefings. During the program, live calls and classroom training alternate every two weeks until the twelfth week, after which the CSRs who graduate are promoted to the floor to take solo calls. Call center Supervisors and Quality Assistance staff from Quality for Customer Operations group do the training, with some occasional outside trainers.

This formal training provides a fundamental working knowledge of the varied aspects of handling calls in the call centers. It increases the new CSR's awareness of the overall environment and functions of the call center and educates the CSR on overall communication and business ethics. Specific topics covered include:

- CIS navigation and functionality
- Bill explanation, meters, and meter reading
- Dispute process
- Move in/move out procedures
- Collections procedures

Interactive Voice Response

The ACO Interactive Voice Response (IVR) system is an automated telephony system that interacts with callers, gathers information, completes some transactions, and routes calls to the appropriate recipient. The IVR system accepts a combination of voice

telephone input and touch-tone keypad selection and provides appropriate responses. ACO has the flexibility to redesign routing among call centers. Incoming calls and workload are affected mainly by seasonality among the eight states.

Some of the IVR features include the ability to route calls to the Speed Pay vendor to make a payment, inquire about the bill balance, prompts for starting or stopping service, prompts for emergency situations such as main breaks or problems, and prompts to select options that will connect directly to a CSR, such as collections.

The IVR routes calls to the first available CSR at either call center. All CSRs are trained to answer any question from any state. The IVR routing parameters account for the one-hour time difference between the two call centers and the after-hours call center vendor covers all hours not covered by the ACO call centers.

Workforce Management

The call centers use a comprehensive workforce planning system that can forecast call volumes and enable flexible scheduling processes. The system generates forecasts and allows for eventualities including sickness, training, absenteeism, and annual leave. It can determine the optimum mix of start and end times for lunch and breaks and manages staffing information.

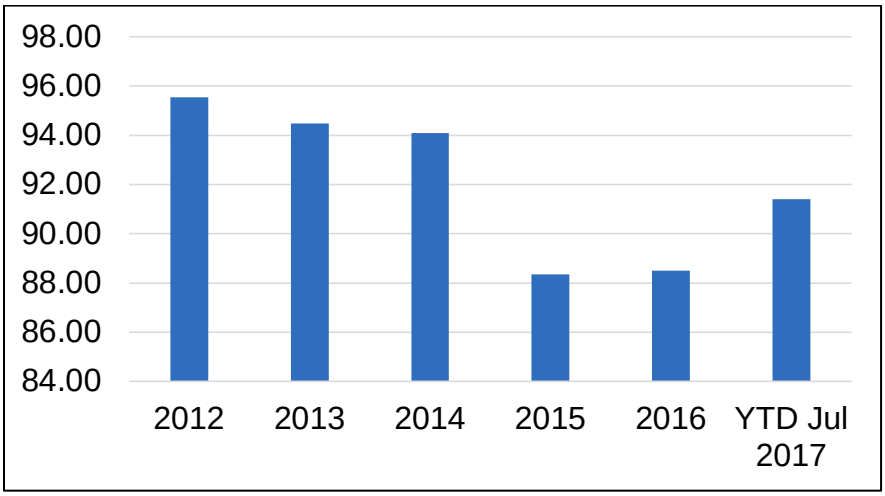
FINDINGS

1. Annual Call Center CSR Quality Call Evaluation scores declined by seven percent through 2016 and have been below the target.

The Quality Assurance (QA) team, reporting to the Quality for Customer Operations unit, is responsible for the CSR call evaluations. The QA staff assess phone recordings of each CSR, using an ACO Call Evaluation Form to record ratings for each CSR within the categories of Foundations Skills, Finesse Skills, and Privacy Control.

The call evaluation scores are aggregated from the individual CSR Call Evaluation Forms for monthly average scores for the call centers. The graph and table below illustrate the results for a multi-year period:

Average Call Quality Evaluation Scores
All ACO Call Centers



Metric	2012	2013	2014	2015	2016	YTD July 2017
All Call Centers	95.54	94.48	94.08	88.34	88.50	91.40

The scores fell substantially from 2012 through 2016 by about seven percent. YTD July 2017 shows a notable recovery, but the average scores remain below the scores in 2012 through 2014. The scores for 2015, 2016, and YTD July were below the target of 92%.

The reduction in call evaluation scores was partially the result of QA staff being temporarily assigned to handle CSR administrative tasks to reduce CSR backlog, including responding to customer emails, electronic faxes, and regular mail; reviewing lock box payments exceptions; and other tasks.

2. The Quality Assurance CSR Call Evaluation Program is inadequate.

The QA staff assess phone recordings of each CSR, using an ACO Call Evaluation Form to record ratings for each CSR within the categories of Foundations Skills, Finesse Skills, and Privacy Control. Call recordings are selected randomly and typically last between two to ten minutes. A CIS screen shot is captured for each recording. The quality scores report is sent to the CSR, supervisor, and call center manager. If a CSR's quality scores fall below 80%, the CSR is coached by a Supervisor.

Prior to June 2016, QA staff assessed each CSR based on ten calls per month. After June 2016, the evaluations were reduced to five calls per month. As of July 2017, these assessments were increased to seven per month per CSR. ACO said that its goal was to resume evaluating ten calls per CSR by January 1, 2018.

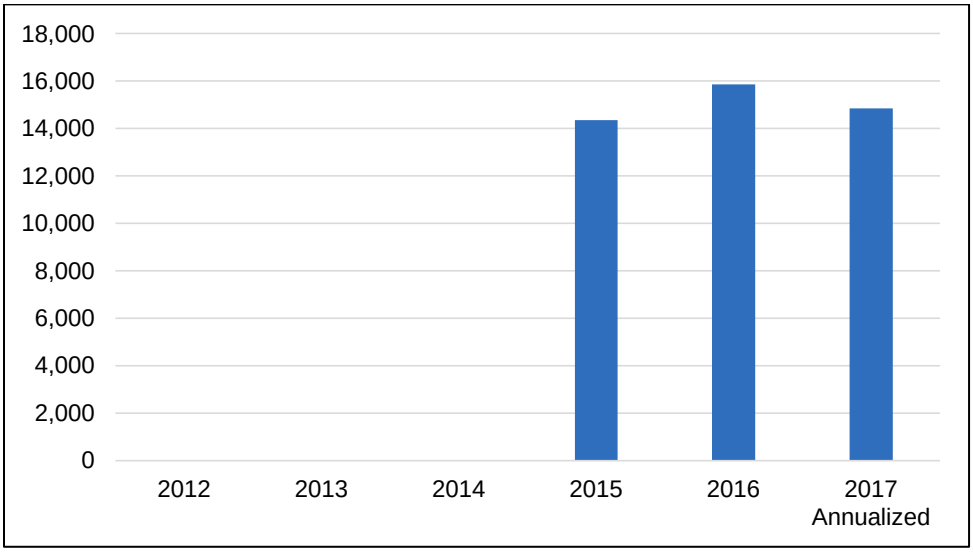
The reduction in the number of call evaluations was the result of QA staff being temporarily assigned to handle CSR administrative tasks to reduce CSR backlog, including responding to customer emails, electronic faxes, and regular mail; reviewing lock box payments exceptions; and other tasks.

The QA call evaluation program is one of the most important methods to improve the skills of CSRs, improve CSR performance and overall call center performance, and to improve the customer experience.

3. The ACO Call Center ratio of calls per Customer Service Representative has improved since 2015.

The following table was used to produce the two graphs for each of the calculated metrics:

ACO Call Center – Calls per CSR



Metric	2012	2013	2014	2015	2016	2017 Annualized
Calls to Queue	1,160,927	1,186,496	1,197,554	1,091,655	1,205,969	1,099,011
CSRs	N/A	N/A	N/A	76	76	74
Calls per CSR	N/A	N/A	N/A	14,364	15,868	14,852

The Calls to Queue are the calls offered via the IVR for connection to the next available CSR. Calls per CSR increased by about ten percent in 2016 over 2015 but decreased by six percent annualized for the first half of 2017.

4. ACO does not maintain multi-year call center staffing, activity, service levels, and unit cost data that would enable performance trending and analysis.

ACO reported that it could retrieve staffing levels from 2015 and later, saying that "Valid data for staffing levels prior to 2015 is not available. Unfortunately, this type of data was not kept on a consistent basis." The staffing data that is available is shown in the following exhibit.

ACO Combined Staffing Levels for the Call Centers

Position	2015	2016	2017
Managers	3	3	2
Supervisors	4	4	4
CSRs	76	76	74

ACO does not track and analyze calls and other work units (for example, average handle time) per CSR and unit costs per CSR. ACO, therefore, does not have trend performance analysis to assess efficiency and utilization metrics. ACO has acknowledged that it does not maintain call center annual activity levels that could be used to assess CSR productivity and utilization.

ACO does not track year-to-year customer service quality metrics, such as the average CSR Service Level (percent of calls answered within 90 seconds). ACO, therefore, does not have the information needed to compare customer calls/contacts (activity levels), CSR staffing levels, and CSR Service Levels (customer service quality) to understand customer service performance.

5. ACO measures individual CSR performance well.

A scorecard is given to each CSR to indicate monthly performance. This scorecard quantifies and measures quality, productivity, service level, attendance, adherence, and average hold time. Each objective has a defined minimum performance expectation, and incentive points are assigned to meeting these expectations. This is a valuable learning and performance improvement tool and is designed to show monthly performance effectiveness and assign incentive points.

6. ACO is beginning to take appropriate steps to improve call center customer service performance management.

New goals and objectives were being formulated for 2018 and will likely include improvements to customer self-service using the external website and Interactive Voice Response (IVR) modifications. One example of a potential self-service enhancement is to provide customers with the capability to complete move-in and move-out requests via the external website. The ACO VP, jointly with State Operations, including Aqua NJ, plans to review end-to-end customer experience and associated processes to identify and implement improvement to business processes, enhanced communications, and other improvements.

7. The ACO call centers do not have First Call Resolution as a key objective and performance metric.

One of the most important good practices for call center and CSR performance is First Call Resolution (FCR). FCR is generally defined as properly addressing the customer's needs the first time they communicate, thereby eliminating the need for the customer to follow up with a second call, be transferred, or be put on hold.

ACO has expressed interest in considering FCR, but at the time of the SAGE Audit there were no objectives or plans to begin the process.

8. Aqua Services does not have Aqua NJ-specific results from the J.D. Power Annual Customer Satisfaction Surveys.

The Aqua America utilities participated in the 2016 and 2017 J.D. Power Water Utility Residential Customer Satisfaction Surveys. The surveys are done for four Regions (Midwest, Northeast, South, and West) and are based on a maximum score of 1,000 points. The Northeast Region includes Connecticut, District of Columbia, Delaware, Massachusetts, Maryland, New Hampshire, New Jersey, New York, Pennsylvania, and Rhode Island. J.D. Power began its program of water utility surveys in 2016. In 2016, Aqua-Northeast received a score of 703 which equaled the average score of 703. The high score in the region was 736. In 2017, Aqua-Northeast received a score of 717. The 2017 average was 704 and the high was 732.

For these surveys, ACO chose to have Aqua NJ and Aqua Pennsylvania consolidated as "Aqua-Northeast." Aqua Services broke its service territories into regions because it was informed that some of its states would not qualify for the survey due to the low number of customers. ACO has said that, "The specific breakdown and details for Aqua Northeast are classified" due to the fact that Aqua NJ does not have access to the breakdown and details for any subsidiaries as this information is held by JD Power. The surveys showed that one other holding company, American Water, has multi-state subsidiaries opted to include its subsidiaries as separate participants, such as New Jersey American Water, New York American Water, and Pennsylvania American Water, which are much larger than Aqua NJ.

9. ACO used J.D. Power to assess the ACO call center CSR training program but has not followed through on potential improvement opportunities.

Aqua Services used J.D. Power to perform an assessment of the call center training program in February 2017. J.D. Power reported three Strengths in its Executive Summary: (1) Positive feedback from recent trainees, (2) Patience shown each individual trainee, and (3) Additions to the classroom work (e.g., taking live calls, test calls, and recorded calls).

J.D. Power concluded that the three largest operational opportunities were:

- Better workforce management planning (for example, planning for attrition through resignations and retirements, both short-term and long-term) will make it clearer when increased hiring of trainees is needed which will eliminate the desire to "rush" CSR trainees out to the floor
- Top performer modeling brings better performers into training, making success more likely
- Increased monitoring and feedback for trainees gets them up the learning curve faster.

The highest priority recommendations were:

1. Assign one or two full-time trainers
2. Add service skills to training
3. Add metrics to track training performance
4. Consider purchasing a learning management system

5. Add self-paced videos to the training program
6. Increase the monitoring done during and shortly after training
7. Collect training program feedback from trainees

All of these recommendations are reasonable and are good customer service practices.

On October 3, 2017, after eight months, the ACO reported that, "No final decisions have been made and the Company is still analyzing what type of reaction and response it will take in response to the survey. We are currently evaluating the recommendation of hiring a trainer." It is unreasonable that no significant planning and no actions have been implemented to address the operational gaps and specific recommendations in this time frame.

10. ACO did not implement suggested customer service improvements made by its market research consultant in the 2015 Customer Satisfaction Study.

The 2015 study made a number of "Suggestions for Improvements for the Call Experience" using data from all states. The suggestions included:

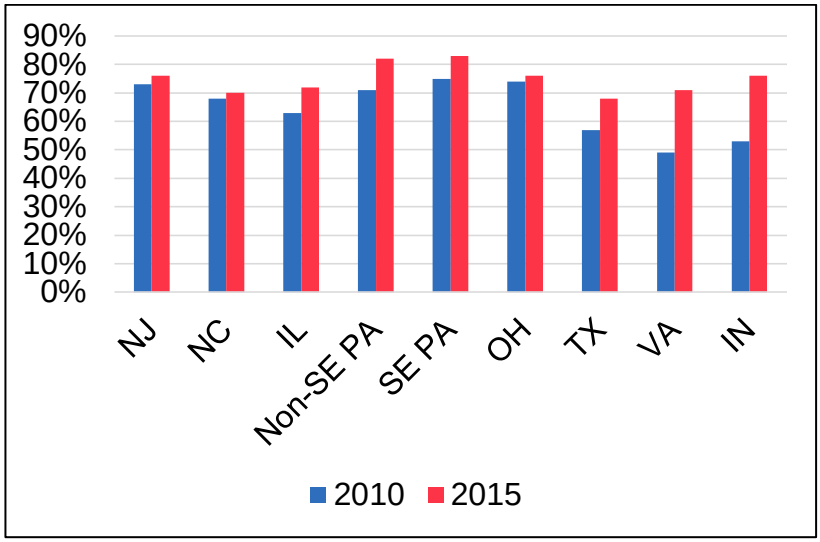
- Improve automated service
- Live person
- More hours
- More information about quality and safety of water
- Prior notification of service interruptions
- More knowledgeable, courteous, and quick response

It is not evident that ACO assessed the suggestions and implemented changes.

11. ACO lacks current and consistent call center customer service transactional surveys.

Customer transactional surveys were performed by a market research consultant, in 2010 and 2015 for the eight states.

Aqua America States – Overall Call Experience



Year	NJ	NC	IL	Non-SE PA	SE PA	OH	TX	VA	IN
2010	73%	68%	63%	71%	75%	74%	57%	49%	53%
2015	76%	70%	72%	82%	83%	76%	68%	71%	76%

The data are four quarter rolling averages representing a combination of "somewhat satisfied" and "very satisfied." For Aqua NJ, the Overall Call Experience increased from 73% in 2010 to 76% in 2015.

The criteria for the two studies were similar but the organization and hierarchy of the criteria were different and the focus between the two studies changed from "Customer Satisfaction" in 2010 to "Overall Call Experience" in 2015." As a consequence, it is not clear that the two studies are sufficiently comparable to deduce meaningful trends over the five-year period. It is likely that changes to demographics, economic conditions, and ACO performance have occurred since the 2015 study and that a more current study would point to new opportunities to improve the customer experience.

12. ACO has an acceptable standardized process for CIS change management.

The CIS houses all customer accounts, billing details, service orders initiated by customers, meter reading data, and customer contact information. There are several hundred CIS users, including employees from ACO, State Operations, Supply Chain Management, and Aqua Services Information Technology (IT). The ACO VP is the primary business owner/sponsor of the CIS and the IT department improves, operates, and maintains the CIS.

Modifications are categorized as "small mods" and as larger project mods. The small mods are needed for conducting normal business and are not generally high risk or high cost. Reasons for the small mods are generally process changes, performance improvements, and regulatory mandates. The project mods generally have higher costs and require more comprehensive business cases and approval processes.

The CIS user creates a request, also referred to as a “ticket,” in the CIS Change Management System (CMS) that tracks the progress and status of the mod. The CMS communicates with IT and tracks progress with notes that are entered. The ACO National Quality and IT Coordination Analyst in the CIS Change and Market Based Activities group assesses each ticket and determines which stakeholders need to be involved, including business users and types of IT resources. IT inputs into the CMS its resource cost and schedule estimates.

The ACO VP is responsible for approving each ticket, based on ACO calendar year budget availability. There is a data field in the CMS for this designated approval.

After approval, IT begins coding and then testing. ACO does business user acceptance testing off-line in the Enterprise Testing System (ETS) environment. This is followed by user testing on-line. The ACO then approves the mod for production and arranges training as needed. Often, the users are a small group that were involved in testing and training is therefore not necessary. All stakeholders sign off on the mod within the CMS system. The entire change process is documented within the CMS and IT can audit the mod as necessary.

13. ACO and Aqua Services Information Technology lack a credible plan to analyze the maintain-or-replace decision for the CIS.

ACO and Aqua Services IT acknowledged that the company’s CIS is approaching the need for a repair or replace decision and has not commenced a full plan to study this issue at the current time. ACO and Aqua Services IT have not demonstrated a comprehensive approach to assessing the CIS repair-or-replace decision. The CIS is experiencing end-of-life problems and ACO and IT are not devoting the necessary priority and analysis to address the problems. ACO and IT do not yet have a CSR-oriented needs assessment, one of the first steps in a maintain-or-replace decision for improving call center performance and customer experience/satisfaction. The CIS documentation, including the flowcharts, have not been systematically updated and maintained.

IT has said that the CIS is running on older technology – server hardware, operating systems, and database versions. IT is reviewing the CIS technological "obsolescence." The CIS "end-of-life" assessment includes user applications, firmware/middle layer, overall architecture, hardware, processors, and data bases. IT is considering plans to upgrade the underlying technology (servers, databases, and middleware) which will include collecting cost estimates, resource needs, and other relevant details to prepare a business case for this upgrade. If the IT Steering Committee approves this project, IT would start an upgrade project in 2018.

The CIS limitations are affecting ACO's ability to identify customer service problems. The CIS can only accommodate one CSR transaction reason per phone call, so if a customer has more than one issue, the CSR has to choose one to enter into the CIS. ACO is therefore not able to retain customer contact and transaction reasons that could help in identifying problems or errors needing correction.

RECOMMENDATIONS

1. **Analyze the decline in annual average Quality Assurance CSR Call Evaluation scores and the below-target performance for the call centers and implement corrective actions. (See Finding 1)**

Potential factors should be analyzed and corrective and improvement actions should be implemented. Several factors already identified could contribute to the decline in the call evaluation performance of the call centers. The numbers of monthly QA assessments of CSRs were reduced. CSR attrition, punctuality, and attendance are reported as major performance problems, but no changes to resolve these problems have been implemented. The J.D. Power assessment of the call centers' training program resulted in recommendations that have not been implemented. ACO should routinely conduct post-transactional surveys with customers to identify issues, problems, and corrective actions.

2. **Correct the problems of the Quality Assurance CSR Call Evaluation Program. (See Finding 2)**

The Quality Assurance (QA) Call Evaluation Program is very important for maintaining and improving CSR performance. The QA Program has several problems that need to be corrected:

- ACO should quickly re-establish the number of call assessments to the historic level of ten calls per CSR per month.
- ACO should evaluate its current minimum acceptable score of 92% and increase it.
- The QA Program should be evaluated for other improvement opportunities, in light of the significant decline in call center QA performance in 2015 and 2016, and the improved performance YTD July 2017, but still below the target of 92%.
- The Program's problems suggest that some combination of CSR hiring, training, coaching, supervision, and QA staff resources is inadequate.

Improved CSR performance will contribute to the quality of customer service and the customer's experience.

3. **Improve call center productivity and utilization in conjunction with customer service quality. (See Finding 4)**

Call center and CSR productivity and utilization can be enhanced with appropriate measures. The measures should be associated with customer service quality metrics so that increased productivity is not achieved through decreased customer service quality. The overall objective should be to have a comprehensive picture of productivity, utilization, and quality.

ACO should implement a CSR and call center Average Handle Time (AHT) metric. The Total AHT includes its three key components - Talk Time, Hold Time, and After-Call Work Time, and should be tracked separately to better identify opportunities for improving call center productivity. Reducing the AHT components per call will increase productivity by allowing the CSR to handle more calls per unit of time and will reduce

the cost per call. The AHT component will require CIS and call management systems capabilities.

ACO should also implement unit costs that convert the AHT components from time (minutes) to costs (dollars) per minute and costs per each of the three AHT components.

Existing and new quality metrics, in conjunction with the AHT and cost metrics, will enable ACO to achieve an appropriate balance among productivity, quality, and cost. In addition to the existing quality metrics, such as Service Level (percent of calls answered within a period of time) and Call Abandonment Rate, First Call Resolution metrics are needed, as recommended elsewhere in this Section.

4. Implement First Call Resolution as a key performance objective and metric. (See Finding 7)

First Call Resolution (FCR) should be one of the highest priority objectives for a utility to improve the customer experience and customer satisfaction metrics. FCR can be facilitated and measured as part of the CIS and phone management systems capability and can also be assessed from post-call surveys of the customers' perceptions of whether the issue was resolved during the call.

There are two related measures: “CSR FCR” is the percentage of callers who spoke with a CSR and did not call back within an established number of days to speak with a CSR again about the same issue. “Total FCR” is the percentage of callers who called and did not call back within the established number of days, regardless of whether they spoke to a CSR or remained in the IVR for resolution.

FCR requires a number of CIS and call management operational capabilities, including a single screen view, or the fewest screens possible needed by the CSR to complete a call transaction. One screen should be the objective. The one-screen model should:

- Give the CSR a complete and comprehensive view of a customer’s information and interactions with the CSRs in call centers (including Web, IVR, and calls) and the Field Service Representatives (FSR) in the field
- Provide the ability to update customer information in one location
- Display critical customer contacts in one place (e.g., scheduled or previous turn-offs, overdue payments, collection actions, and outages)
- Display and update all customer billing and payment enrollments in one place. It will reduce handle time, including call duration and after-call work

Quantifiable targets are needed to help drive FCR improvement. Metrics should include both FCR success rate and unit cost per FCR, by CSR, by call center, by month YTD, and annually year-to-year.

5. Explore the ability to include Aqua NJ as a stand-alone participant in the J.D. Power Annual Customer Satisfaction Surveys. (See Finding 8)

ACO should explore the ability to include Aqua NJ as a stand-alone participant in the J.D. Power Annual Customer Satisfaction Surveys or other applicable surveys. This will

provide customer service level trend information and assist in the identification of customer service improvement opportunities in New Jersey.

6. Implement the J.D. Power recommendations for improved CSR training. (See Finding 9)

The J.D. Power recommendations for improved CSR training are reasonable and their implementation will likely lead to better CSR performance and improved customer experience and satisfaction.

7. Implement the 2015 Customer Satisfaction Study recommendations for improved customer experience. (See Finding 10)

The recommended improvements are reasonable and will contribute to improved customer service. ACO should implement the improvements from its consultant's report. Also, see Recommendation 8 in this section for performing periodic studies, which may detect and measure the effects of the improvements in subsequent studies and are likely to produce additional improvement opportunities.

8. Perform periodic customer satisfaction transactional studies and other annual studies and surveys. (See Finding 11)

Customer research and customer satisfaction studies are done sporadically and while the results may have been useful at those times in identifying areas needing improvement, it is time to establish a structured research program that periodically identifies weaknesses that need to be addressed and to manage an implementation process for improvements.

ACO should design customer satisfaction studies so that root cause problems can be identified and can lead to improvement opportunities and so that all the states will share the benefits of changes to common systems and management, as well as state-specific operations. The studies should be done annually to:

- Understand the customer transactional experience
- Assess the trending of year-to-year transactional study metrics
- Understand how the relationship of the study metrics relate to ACO's internal metrics that are tracked through the CIS
- Identify changes that are needed to systems, business processes, and CSR training

The ACO annual studies should be compared to the J.D. Power Annual Customer Satisfaction Surveys to correlate and corroborate the data from the two sources and to further identify opportunities for improvement.

Annual customer surveys should also elicit information about water use practices and water-using appliances to facilitate more analysis of behind-the-meter conservation.

9. Develop a credible plan for improving and maintaining or replacing the CIS. (See Finding 13)

ACO has recognized the limitations of the existing CIS and has said it will consider solutions. ACO should accelerate this process and commit to a comprehensive plan for either improving and maintaining the CIS or replacing it. Achieving the next level of

customer service and improving the customer experience demands that an improved CIS or a new one, (in association with call management systems) have the capability of supporting new customer quality metrics, such as First Call Resolution (FCR), new productivity metrics, such as Average Handle Time (AHT), and new unit cost metrics, discussed elsewhere.

ACO should include the benefits of good customer service practices, noted above, in the CIS maintain-or-replace decision analysis. For example, ACO should consider the avoided costs of a full-scale CIS replacement when analyzing the ongoing maintenance and improvement costs of the existing CIS. If a full-scale replacement is not justified, ACO could reasonably justify spending more annually than is currently being spent in order to achieve better customer service practices and performance metrics improvements.

F. COMPLAINTS

BACKGROUND

Routine complaints about matters such as estimated bills and water service problems are resolved by the ACO CSRs and Aqua NJ field service personnel on a daily basis. However, there are two types of escalated complaints, those to the NJBPU and those to Aqua America executives.

New Jersey Board of Public Utilities Complaints

When an NJBPU complaint has been received by the Aqua NJ Operations Support Coordinator, a proposed complaint resolution is provided to the customer within 24 hours. A response is then sent back to NJBPU via their website. The response includes the cause of the problem, actions taken to resolve the issue, and a proposed resolution. NJBPU complaints must be responded to within 25 days. Once a resolution has been met, the case details are logged into Aqua Complaint Exchange System (ACES) for tracking purposes.

ACES is a web-based application that is used to track formal complaints. Complaints are tracked for date received, type of complaint, customer information, and completion. ACES only interfaces directly with the Pennsylvania Public Utility Commission's File Transfer Protocol (FTP) server. For the other seven states, including Aqua NJ, the ACES Email Box is used to receive customer complaints from the respective seven commissions. When received, the NJ Regional Customer Care Team Lead will log the complaint into ACES.

Executive Complaints

Executive customer complaints are typically complaints that are received through channels outside the call center and directed to the CEO or state president. Once received, they are then forwarded to the Regional Customer Care Lead for Aqua NJ for customer contact, review, and resolution. ACO does not have records for these types of complaints prior to 2016. Two Aqua NJ executive complaints were received in 2016 related to customer shut-off for non-payment. There have been no executive complaints in 2017.

FINDINGS

1. Aqua NJ customer complaints filed with the NJBPU have increased by 47% from 2013 through 2017.

The following table shows Aqua NJ customer complaints to the NJBPU for a multi-year period.

NJBPU Complaint Trends

Complaint Type	2013	2014	2015	2016	2017
Termination/Notice of	28	26	21	27	43
Miscellaneous	0	0	0	1	3
Payment Arrangement	2	3	10	1	0
Customer Service	2	2	7	2	1
Property Damage/Maintenance/ Claims	0	0	0	2	2
Billing Dispute	3	12	13	10	5
Estimated Bill	0	0	0	0	1
Payment/Credit Issue/Deposits	1	0	0	0	1
Work Order Issue	2	0	0	1	0
Rates	0	5	5	0	0
Total	**38**	**48**	**56**	**44**	**56**

The complaints shown in the above table increased by 27% in 2017 compared to 2016 and were at the same level as 2015. The erratic year-to-year numbers suggest that more information about root causes will reduce or at least stabilize the number of complaints.

2. It is likely that Aqua NJ internal tracking of customer dispute types are not being accurately categorized and ACO is missing an opportunity to understand the types and trends of disputes and to identify opportunities to improve performance.

In contrast to the NJBPU complaint data, Aqua NJ "disputes" are an internal metric that represent customer grievances. Aqua NJ categorizes most of its disputes as "High Bill." For example, there were 111 total disputes in 2016, 108 of which were High Bill disputes. Although bill impacts from increased rates could account for some number of Aqua NJ disputes that were categorized as "High Bill," it is most likely that ACO is incorrectly reporting the disputes. It is reasonable that disputes about high bills would be most numerous; however, one would expect that there would also be a significant number of disputes about service termination notices and payment arrangements, as shown in the table of NJBPU Complaint Trends. In fact, ACO staff observed that typical complaints include termination notices, payment arrangements, and bill explanation, none of which are identified as Aqua NJ dispute types.

RECOMMENDATIONS

1. **Analyze the root causes for the increased NJBPU complaints and implement improvements that will more closely address customer problems. (See Finding 1)**

ACO should investigate the NJBPU complaints with the objective of identifying root causes. Root cause analysis will require better information about the complaints and changes to the existing complaint handing process. Even if complaint categorization is accurate, the root cause may not be readily visible. For example, a complaint categorized as "Billing Dispute" may be a result of a recent announcement of a rate case application, an actual rate increase, a behind-the-meter leak, a change in the customer's water-using appliances, or increased usage due to the number of household members. Understanding more about the underlying reasons for each of the complaint types will enable ACO to provide specific information that will help the customer.

2. **Develop a consistent approach for more accurately categorizing and tracking Aqua NJ disputes. (See Finding 2)**

Historical inconsistencies in the categorization of Aqua NJ disputes suggest that the dispute format and process should be reassessed so that significant changes in dispute types and monthly and annual trends will be reflective of actual dispute types and problems. Better, more accurate data should lead to identification of root causes and point to process corrections and improvements.

G. REVENUE PROTECTION

BACKGROUND

At the beginning of each month, a Zero Consumption Report is submitted through the CIS that identifies accounts that have failed to register consumption for the past six months or greater. All active accounts that appear on the Zero Consumption Report are investigated by Field Service Representatives (FSR) in the Aqua NJ Divisions.

FINDING

1. **Aqua NJ lacks theft of service metrics.**

Aqua NJ does not have theft of service metrics. ACO and Aqua NJ indirectly look for potential theft issues by following up on zero consumption readings. The total number of zero consumption reads in NJ for 2017 was 18,410 out of a total 622,316 active reads, about three percent of the total reads. ACO and Aqua NJ do not track and report the number of incidents that are determined to be theft-related and do not estimate the revenue losses. Non-revenue water losses are not an indicator of theft of service because the measure includes main leaks, other system losses, metering errors, and other non-theft-related causes.

RECOMMENDATION

1. **Develop and track theft-of-service metrics. (See Finding 1)**

ACO and Aqua NJ should develop new metrics associated with zero consumption investigations, such as the number of confirmed theft incidents and associated estimated revenue losses. Tracking the data to identify patterns or trends based on

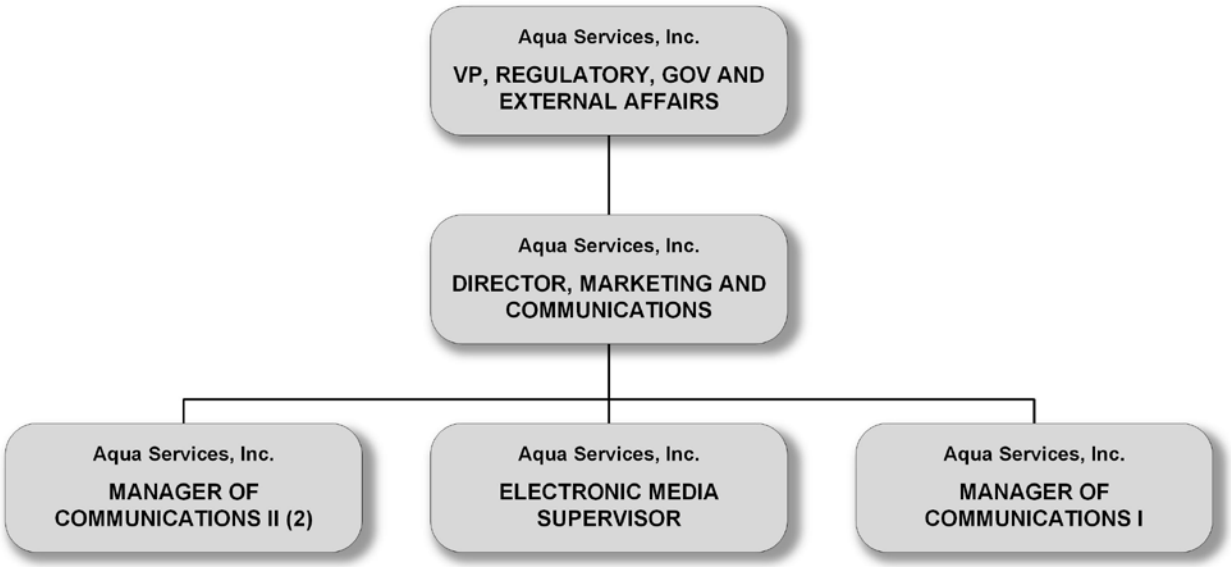
geographical areas, types of accounts, and other indicators will lead to better theft control and revenue loss management. Additional useful metrics include cost per zero consumption field investigation, the ratio of investigated confirmed thefts to non-thefts, and the amount of revenue recovered or future loss avoided per zero consumption investigation.

H. COMMUNICATIONS AND CONSERVATION

BACKGROUND

The Director of Marketing and Communications reports to the Vice President of Regulatory, Government, and External Affairs. The Director has four direct reports: two Managers of Communications II, an Electronic Media Supervisor, and a Manager of Communications I, as shown in the following organization chart:

Marketing and Communications Organization Structure



Although the department title includes "Marketing," neither Aqua Services, ACO, nor Aqua NJ sell services or products to the utility customers other than water and wastewater services. The department's principal mission is to educate customers on water conservation and to inform them on customer service issues.

The Manager, Communications I, is the liaison with Aqua NJ for communications initiated by Aqua NJ and ACO and meets monthly with the Aqua NJ President. This person also has the same responsibilities for Illinois and North Carolina. The Electronic Media Supervisor is responsible for the social media management software which monitors various social media for references and comments about Aqua America. The references are "tagged" to customer accounts if possible and go to a private feed to protect identities and the Electronic Media Supervisor can reply with messages as needed. One Manager of Communications II is the communications liaison for Pennsylvania, Ohio and Indiana. The other is responsible for Texas, Virginia, and Human Resources.

Aqua NJ communicates with customers for a variety of reasons, including major repair work with direct letters and certain water testing results with environmental notices.

The Marketing and Communications group uses various methods to educate and inform customers:

- Newspaper notices
- Bill inserts
- Messages printed on the bills
- Direct mail customers
- Postings to the website
- WaterSmart Alerts to email, phone, and text
- Educational campaigns on social channels

For example, rate case information is included in newspaper notices, bill messages, and postings on the website. Billing and payment options and conservation information are located on the bill and website. Conservation and customer service information are also located on social media channels.

The Aqua Services Communications group promotes "special observance" days and weeks with communications that are aimed at educating customers. In 2017, these included: National Groundwater Awareness Week, Fix a Leak Week, Lead Poisoning Prevention Week, and National Water Quality Month.

Conservation Communications

The Aqua Services Marketing and Communications group is responsible for promoting conservation by customers (downstream of the meter). Aqua NJ efforts to reduce water losses upstream of the meter are covered in Chapter III, Systems Operations. The public education program for customer conservation is primarily communicated with conservation awareness messages on the bill and bill stuffers. Residential and small commercial conservation topics include:

- Replacing appliances with higher-efficiency models
- Replacing plumbing fixtures with water conserving models
- Replacing toilets with low flow models
- Fixing leaks by replacing faucet washers and toilet flappers
- Making changes in kitchen and laundry practices
- Reducing over-watering lawns or landscape
- Installing water-efficient landscaping
- Encouraging the use of a controller (timer or clock) to allow watering during the proper times and on schedules
- Detecting and repairing leaks in irrigation systems
- Making changes in outdoor use such as watering during the coolest part of the day, not watering on windy days
- Encouraging the use of soaker hoses or trickle irrigation for trees and shrubs
- Installing moisture sensors on sprinkler systems

- Using mulch around shrubs and garden plants to reduce evaporation
- Discouraging hosing off patios and driveways to clean
- Using a hose with an automatic shut-off nozzle
- Using a commercial car wash that recycles water

Topics for larger commercial and industrial users include:

- Eliminating "once-through" cooling
- Installing a rinse-water recycle system for large laundries
- Using high-efficiency clothes washers for small laundries
- Shutting off cooling units when not needed

Mailings to the consumer also alert customers that Aqua NJ can provide public speakers to address the topic of water conservation. Aqua Services communicates this through the billing system or via direct contact with specific organizations, schools, and appropriate municipal officials.

To facilitate customer conservation and, in an effort to assist a customer calling regarding a high consumption water bill, a CSR will ask the customer a series of “High C” (high consumption-related) questions. If there have been no changes that would explain an increase in water consumption, the CSR asks additional questions to see if there may be a leak on the customer’s side of the meter. If the customer answers “no” to all High-C questions, a customer leak information kit is mailed to assist in checking for leaks. If the customer finds no leaks and calls again, a High-C field service work order is generated and a 30-day hold placed on the account until the issue is resolved. "High-C specific metrics are not tracked."

Aqua NJ has a program that encourages customers to repair leaks on their property and reduce water loss. The Aqua America website has a link to the New Jersey Leak Adjustment Request Form. The form states: "Aqua may grant a onetime leak credit adjustment to an account when a major leak has occurred on the customer’s service line which requires repairs and has caused significant excessive increase in consumption. Before Aqua will consider granting an adjustment, the leak must be repaired and the appropriate written documentation must be provided to Aqua. Receipt of documentation in and of itself does not qualify a customer for a credit. A review of your documentation will determine if a credit can be granted. If your request is denied, you will be notified in writing. A onetime adjustment will be considered for a leaking toilet fixture. This adjustment will be based on 50% of the excess in billed amounts as calculated from the previous three consecutive billing periods. Adjustments will not be considered for new construction where the permanent resident has occupied the property for less than one year."

FINDINGS

1. **Marketing and Communications has a comprehensive "2017 Marketing & Communications Plan" that sets objectives and goals aimed at improving communications with customers, community representatives, and employees.**

The Plan includes objectives, strategies, and implementable tactics for the State-Specific Focus and objectives for its Social Media Program. Topics include scheduled

meetings, subsidiary/state spotlight, employee communications, proactive media relations, rate case support, capital projects, and community relations. Marketing and Communications set a goal to increase positive feedback commentary on social media by five percent by the end of 2017, supported by actionable tactics. The 2018 Plan was not available during the SAGE Audit.

2. Marketing and Communications has appropriate plans to improve the online customer experience.

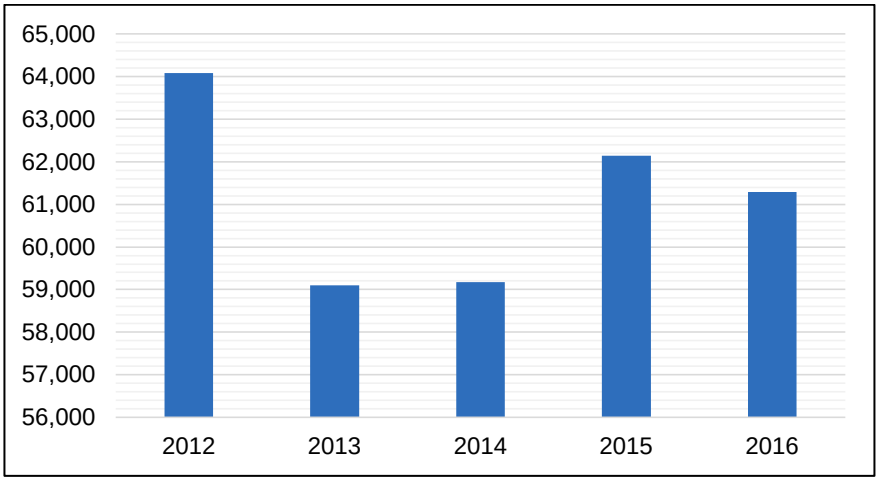
At the time of the SAGE Audit, the Marketing and Communications unit was moving forward with its Customer Experience Website Project. The project is designed to issue a Request for Proposal (RFP) for consulting assistance, seek input from stakeholders throughout Aqua Services and Aqua NJ, redesign the website so that it is more user friendly, and add online transactional capability. This project was not included in the initial 2017 Marketing and Communications Plan.

Marketing and Communications has said its goal is to create more opportunities for customers to receive information or pay their bills from their phones or on-line. Another opportunity is possibly to allow customers to request move-ins and move-outs on-line. If these conceptual plans are implemented, Marketing and Communications has said it will be working on a comprehensive customer communication strategy to increase customer awareness of the benefits and tools available to them for online electronic billing and payment.

3. Customer conservation, measured by decreasing gallons sold per residential customer, has improved since 2012.

The graph and table below illustrate the gallons sold by Aqua NJ to residential customers per year.

Aqua NJ Gallons Sold per Residential Customer



Metric	2012	2013	2014	2015	2016	Percent Change 2012–2016	CAGR[1] 2012–2016
Customers	48,184	48,380	48,790	49,068	49,586	2.91%	0.72%
Gallons (millions)	3,088	2,859	2,887	3,049	3.039	−1.59%	−0.40%
Gallons per Customer	64,088	59,095	59,172	62,138	61,287	−4.37%	−1.11%

[1] Compound Annual Growth Rate

Over the five-year period, Aqua NJ experienced a reduction in gallons used per customer. The graph and table show a notable reduction in usage of 4.37% per customer based on the percent change from 2012 to 2016 and 1.11% based on the compound annual growth rate (CAGR) over the same period. The CAGR calculation dampens the effect of the intra-period volatility usually caused by differences in rainfall and irrigation usage and assumes a constant rate of compounded change.

ACO has said that, "Declining trends in consumption/production per customer is a nationally recognized phenomenon in the water industry. As customers replace household appliances with more efficient appliances like toilets, shower heads, dishwashers, and washers coupled with a generally accepted conservation ethic, consumption has continued to decline."

RECOMMENDATION

1. **Implement the Customer Experience Website Project to improve the customer experience. (See Finding 2)**

Utilities are recognizing the importance of providing online users more ability to complete transactions that previously required phone calls or written communications. Enabling transactions, such as move-in and move-out by customers on a round-the-clock schedule will increase customer satisfaction and reduce transaction costs.

I. PERFORMANCE MANAGEMENT

BACKGROUND

This section provides findings and recommendations that are applicable to Aqua NJ and most ACO organizational units and functions regarding performance management.

FINDINGS

1. ACO began to improve workload tracking and performance reporting in 2017.

There was recognition in 2017 for the need to focus on performance management reporting and trending. A number of changes were underway, including revisions to the State Scorecards. ACO senior management now uses a business intelligence dashboard tool to display a number of performance metrics (the first four) and activity counts (the latter three), including:

- Aggregate Service Level
- CSR Abandonment Rate
- Aggregate Abandoned Rate
- CSR Service Level
- Total Adjusted Calls Offered
- Calls Offered to Automation
- Calls Offered to CSR Queue

The data that are displayed are either volumes or percentage figures. There are two graphs: one stacked bar graph depicting monthly Aggregate Call Volume CSR vs IVR/Automation and a pie graph showing CIS system CSR Contact Category/Reasons.

2. ACO lacks a comprehensive approach to performance reporting.

Existing Reports

There are three existing reports but, in their present configuration, either taken individually or together, they do not serve as adequate performance management reports:

- The ACO VP has recently identified Call Center Aggregate Service Level and YTD CSR Abandonment Rate as key metrics, which are displayed, among other metrics, in a dashboard tool monthly report. Only two of the eight metrics have associated target goals.
- The ACO VP does not have an ACO-specific Scorecard, and the Aqua NJ Scorecard itself is not an effective ACO performance management tool. The Aqua NJ scorecard was originally designed to measure performance of senior level personnel in State Operations for incentive compensation-related performance. The Scorecard lacks ACO-wide specific performance metrics, such as the ACO VP's recently identified two key performance Call Center metrics (Call Center Aggregate Service Level and YTD CSR Abandonment Rate). Further, the Aqua NJ Scorecard includes metrics that State Operations have little or no control over. There are four Customer Operations metrics: the

first three metrics are oriented to cash flow and financial performance and the fourth focuses on complaint-related regulatory oversight.

- ACO prepares periodic State Opportunities Meeting reports for use with the meetings. The July 2017 Aqua NJ State Opportunities Meeting Report partially replicates the metrics included in the 2017 Aqua NJ Scorecard and has the same shortcomings as the Scorecard. It has some metrics that are not controllable by Aqua NJ State Operations and lacks the ACO's newly identified key performance metrics, as noted above.

Despite recent efforts to improve performance reporting, ACO lacks important components as described below.

Alignment of Accountability and Authority

All three reports discussed above lack identification of accountability or are assigned to owners who have little or no authority and control over the function being measured. Without clear alignment of accountability and authority and appropriate ownership and control of the metrics so that accountable managers can act to improve performance, the reports are not adequate.

Metric Tracking and Trending

ACO does not utilize performance tracking and trending fully. ACO and Aqua NJ do not have consistent year-to-year and month-to-month metrics that are tracked and trended. For example, the Aqua NJ Scorecards do not have metric data reported for some years for all metrics. Without consistent trending, responsible managers are not able to detect and focus on negative trends to control performance, make corrections, or change processes.

Targets and Actuals to Identify Variances

The existing reports do not consistently show performance targets versus actuals, so that variances are not highlighted. The reports frequently lack displayed month-to-month, YTD, and year-to-year variances.

Graphic Displays

The Aqua NJ Scorecards display metrics in table format only and are overly crowded with information. In printed form, they are hard to read. The lack of graphs makes it difficult to interpret the information. The ACO VP's monthly dashboard tool report has some graphical displays but includes most metrics in table format, making it difficult to interpret and see trends.

3. ACO lacks sufficient analytic and performance-oriented staff resources but is planning to add a second resource.

ACO analytic performance resources have been limited to one individual, with the title Aqua Customer Operations Reporting Analyst, who reports to the ACO Director of CIS Change and Market Based Activities. ACO has said that it is planning to expand its analytic capability and has identified the purpose and skills requirements: "This position will be used to expand and enhance the level of reporting and analysis that is used to manage key aspects of our operations and customer experience. The ability to report,

trend, analyze, and predict is critical to managing a customer operations organization. In addition, this position will help of identify process improvement opportunities, identify customer efficiencies and operational efficiencies as well as assist with managing emergency situations e.g. hurricanes and outages to help us respond quickly and effectively."

Even with the existing Aqua Customer Operations Reporting Analyst and the planned hire of an additional analyst, ACO's analytic capabilities may not be sufficient to support an inter-utility benchmarking function, the development of unit costing for performance metrics, preparation of monthly performance metrics and reports, and the support for ACO's Directors and their performance analysis and management responsibilities.

4. The NJ State Opportunities meetings do not document ACO or Aqua NJ customer service performance issues and action items.

There are State Opportunities Meetings every other month between the Aqua America corporate staff and each of the eight states. The format consists of wide ranging topics. Agendas are produced, teleconference meetings are held, and matters are discussed. Typical agenda items may include: financial overview (rate cases, capital, O&M budgets, and spending), customer growth and acquisitions, regulatory compliance, and customer service.

ACO representatives participate in the State Opportunities Meetings and there is a dedicated Regional Customer Care Lead for each state, including Aqua NJ, who participates in these meetings. Other participants include Aqua NJ State Operations representatives: the Aqua NJ President and Controller, Engineer, Manager of Water Quality, and District Superintendents. ACO prepares state-specific PowerPoint presentations for use during the meetings.

There are no ACO or Aqua NJ records or documentation that these meetings identify customer service performance management "opportunities," such as actions needed to address declining performance metrics, lack of goals achievement, or specific problems and issues.

ACO has said: "Action items to follow-up on in the State Opportunities Meetings include questions that could not be answered during the meeting, or ad hoc requests. Specific examples are not available. The State Opportunities Meeting is simply a management meeting to exchange updates between Aqua NJ and Aqua Services management, including ACO. It is not focused on specific “opportunities.” Previously, it was called the State Issues Meeting, but this was changed to create a more positive tone."

5. ACO does not use unit costs for performance management.

Although unit costing is typically considered an important part of overall cost and performance management, ACO has only used unit costs for budget variance analysis. Most well-regarded utility companies and competitive industry companies have developed unit cost management performance metrics or recognize their importance and are moving in that direction.

Neither ACO nor Aqua NJ use unit costs as part of performance management. ACO has acknowledged that it does not track unit costs as a performance metric and it has not done any recent studies of unit costs.

The following are examples where ACO does not use unit costing for performance management.

ACO Cost Tracking by Function

ACO provided customized tables depicting spending by organizational area for 2016 and July YTD 2017, but not for pre-2016 years. The ACO Operations and Maintenance (O&M) budget for Aqua NJ is categorized by the functions listed in this exhibit:

Aqua NJ ACO O&M Spending ($)

Function	2016	Year-to-Date July 2017	2017 Annualized
Administration (allocated)	29,587	15,231	26,110
Rates and Contracts (allocated)	46,465	30,357	52,014
Quality Management (allocated)	39,730	25,291	43,356
Cash and Collections (allocated)	63,676	32,938	56,465
Billing and Meter Operations (allocated)	43,482	19,386	33,233
Customer Care Coordination (allocated)	15,241	7,849	13,455
Customer Care Coordination (NJ-specific)	79,934	46,458	79,642
Customer Service / Call Centers (allocated)	357,537	184,645	316,534
National Dispatch (allocated)	25,741	13,100	22,457
Total	**696,395**	**375,255**	**643,294**

For 2016, Aqua NJ's allocated ACO costs were $621,461 (89%) and Aqua NJ State-specific costs were $74,934 (11%), totaling $696,395. Based on YTD July 2017, Aqua NJ's 2017 annualized allocated costs were $563,652 and Aqua NJ State-specific costs were $79,642, totaling $643,294. Based on this projection, 2017 State-specific costs are about the same as 2016 and the 2017 allocated costs are four percent lower than 2016. Although the annualized 2017 spending suggests that costs were decreasing, it is only a linear projection and actual final spending for 2017 may be a function of seasonality and other non-linear spending that could cause the actual final amount to be greater than 2016.

The listed functions do not correspond directly to the four ACO organizational units. ACO has said that, "costs are not tracked by organizational area and require a significant amount of resources to pull the data." The ACO VP and the four ACO Directors do not have performance metrics that measure the cost of the value of the services they provide. Without this type of unit cost management, ACO does not have a full picture of its performance levels and therefore is missing opportunities to reduce costs for the same level of output or increase the level of output for the same or lower costs.

Customer Payment Processing

Aqua NJ has been experiencing an increasing percentage of electronic payments and a decrease in printed payments. (See Section C. Billing and Payments, above.) Without a measure of cost reductions associated with the decrease in printed payments, such as cost per electronic payment and cost per printed payment, it is not clear if and to

what extent ACO should exert more effort in promoting electronic payments to its customers.

Call Center Operations

ACO does not measure and track transaction unit costs associated with Call Center Operations and CSR performance. Examples include:

- Minutes per CSR call and cost per CSR call
- Minutes per call type and cost per call type
- Minutes and cost per average
- Average handle time per CSR and each of its components: talk time per call, hold time per call, and after-call work time per call
- Cost per average total handle time, cost per talk time, cost per hold time, and cost per after-call work time

6. ACO lacks a benchmarking program to support performance management.

ACO has begun to participate in the annual J.D. Power Water Utility Residential Customer Satisfaction Surveys. The 2017 Aqua NJ Scorecard includes some references to "AWWA Benchmark Median," but virtually none for Customer Operations and Metering Operations. ACO and Aqua NJ lack a plan to use benchmarking as part of performance management.

7. ACO lacks adequate contract management and vendor performance oversight.

ACO acknowledged that it did not have a central repository or an up-to-date list of contracts. ACO said that it "does not have the time or resources to review each of these contracts at this time." ACO had identified a point person to identify, inventory, and review existing ACO contracts. A complete list of contracts was eventually provided. SAGE reviewed these ACO-related contracts for scope, duration, renewal, and for service level agreements (SLAs), including performance metrics and reporting. The complete list, with information supplemented from several sources, is in the following exhibit.

ACO Contracts and Aqua NJ 2016 Expenses

Vendor Description	ACO Owner	Purpose	2016 Aqua NJ Expense
CIS Maintenance Services	ACO VP	Maintenance of Source Code	N/A
Billing Services (Three Services from One Vendor)	Billing	Bill Print/Aqua Online	$98,605
	Billing	Bill Print/Aqua Online	$203,111
	Billing	10-Day Notice/TOBK Letters	$2,254
Outside Payment Locations	Payments	Non-Aqua Retail Locations	$5,112
Lockbox Bank	Treasury (not ACO)	Lockbox Payments	$67,703
Call Center Services	Not Specified	After Hours Calls	$10,860
Payment Consolidator	Collections	Payment Consolidator	$2,122
Tertiary Collections Agency	Collections	Collections	$825
Estate Collections Law Firm	Collections	Collections from Estates	$123
Interactive Voice Messaging Services	Collections	IVM Call Collections 72-Hour Notice	$2,539
Primary Collections Agency	Collections	Collections	$2,094
Primary Collections Agency	Collections	Collections	$1,994
Secondary Collections Agency	Collections	Collections	$787
Primary and Tertiary Collections Agency	Collections	Collections	$3,328
Secondary Collections Agency	Collections	Collections	$676
Revenue Mining Services	Collections	Data Mining to Match Inactive A/R Bad Debt to Active Customer Account	$340
Process Documentation Software Services	ACO	License Support	?
		Total Aqua NJ Expense	**$402,473**

SAGE reviewed the 16 contracts listed in the above table:

- ACO was asked to provide five years of annual payments to vendors paid by Aqua NJ, but only provided 2016 and a partial year 2017.
- Aqua NJ total expenses for 2016 were $402,473.
- The billing services contract accounts for $303,970, or 76% of the total.
- 13 contracts are characterized as "auto-renewal" or the equivalent "notice to terminate" with implementation or signed dates ranging from 2003 to 2017.

These 13 contracts have auto-renewed for at least three years and for as much as 14 years.

- An ACO owner of the outsourced call center services contract is not identified.
- The lockbox bank contract is owned by Aqua Treasury, but these services are used by ACO for processing customer bill payments.

Contract Management

ACO has routinely allowed contract auto-renewals and allowed contract terms to expire without a performance review, for as few as three years to as many as 14 years, with no policies, procedures, or performance criteria for planned contract renewal, renegotiation, cancellation, or rebidding for the services.

The assignment of ACO employees for contract ownership is not formalized and, for one contract, there is no assigned owner. The lockbox bank contract is owned by Treasury but was considered an ACO-related contract. It is unclear if ACO has a shared ownership arrangement with Treasury or to what extent ACO has influence over the contract management. Existing owners are organizational units within ACO, not a specific employee for each contract.

SAGE's review of the contract documents found that service level agreements (SLAs), or performance metrics and requirements, were either not spelled out or were too loose to provide adequate performance protection. For example, the billing services contract specified that 98% of daily bills will contain accurate information on customer bills. As much as two percent, therefore, could be inaccurate under the contract terms. With three million customers, the number of acceptable inaccurate bills is substantial.

Vendor Performance

ACO has no policies or criteria for ongoing periodic vendor performance assessments. Performance metrics for some, but not all vendors, specifically the collection agencies, are tracked; however, important performance metrics are missing, such as costs per unit of service and variance of actuals compared to service level requirements. Even where ACO tracks vendor performance, there was no evidence of performance analysis that led to decisions to renegotiate contract terms instead of passive auto-renewal.

The after-hours emergency call center services vendor provides monthly reports to ACO that show the call types and volume by Division and state, including Aqua NJ. Data is shown for the current month, the prior two months, and a delta or difference between the current month and the average of the prior two months. However, year-end data and YTD data are not provided, analyzed, or managed. The activity volume metrics from the vendor are not used by ACO to assess vendor compliance with contract terms or analyze performance effectiveness or productivity that can be compared to ACO's own call centers. Metrics, such as handle time per call and vendor costs per call, are important performance measures and could also be used to compare ACO call center performance for similar call types.

The ACO VP began to meet with vendors in the fourth quarter 2017 to begin the process of assessing contract terms and conditions and to prepare for renegotiating soon-to-expire contracts. The ACO VP was planning to renegotiate the billing services contract, which provides bill processing, printing, and mailing services, and was due to

expire on December 31, 2017. At the time of the audit, no consideration was being given to rebid the contract. The contract was implemented/renewed in 2014 and accounts for 76% of ACO-related vendor annual costs for Aqua NJ. The ACO VP was also planning to review the contract for the after-hours emergency call center services.

8. The ACO business process documentation tool does not support process analysis, training, and job descriptions.

The Aqua America business process documentation tool is not used for workflow optimization and process improvement. This contract-licensed tool was originally procured as an analytical software tool to help determine the CIS maintain/replace decision. It no longer serves that purpose but is being used to create a compendium for ACO processes and procedures. At the time of the SAGE Audit, processes for billing, collections, rates, and other customer service-related functions were being documented. The tool is adequate for documenting SOX controls.

However, the new ACO VP, who is interested in understanding and assessing workflows for the purpose of process improvements, has acknowledged the process documentation tool does not facilitate workflow analysis. The tool also is not used for creating job descriptions or for training.

SAGE reviewed a sampling of the descriptions contained in the process documentation database, including bill production, customer service disputes, collections service orders, zero consumption meter reading, and service terminations in error. SAGE confirmed that the format and content and lack of useful process flowcharts and workflow handoffs among organizational units make the tool inadequate for process and performance management use.

RECOMMENDATIONS

1. Establish a comprehensive set of ACO performance metrics. (See Findings 2 and 5; and Section B. Metering and Meter Reading Finding 2, Section D. Credit and Collections Finding 2, Section E. Call Center Operations Findings 4 and 7, and Section G. Revenue Protection Finding 1)

The following is a compilation of performance metrics that ACO lacks and that are recommended, in other sections of this chapter. Specific reasons for implementing these metrics are included in the relevant Recommendations in the sections. In all cases, the metrics should be tracked by state, so that they can be reported for Aqua NJ. SAGE recommends that ACO assess its current state of performance metrics, decide which ones are necessary for measuring performance and eliminate ones that are not, and add new metrics that will enable ACO to improve the following types of performance:

- Customer experience and satisfaction
- Call center operations
- Employee utilization and productivity
- Cost management
- Vendor management

Metering and Meter Reading

Eliminate these metrics that are included in the "2017 Aqua NJ Scorecard:"

- Total Meters Replaced
- Inactive Sewer Only Accounts
- Inactive Water Accounts

Add the following:

- Total meters replaced as a percent of planned or required meters per month
- Average or range of meter-tested accuracy, per month
- Percent of meters replaced that have failed accuracy requirements, per month

Credit and Collections

ACO should add collection agency and collection management metrics, such as:

- Recovery rate per placement and per dollars allocated, per agency
- Cost per dollar recovered, by agency
- Recovery cost per customer account, per agency
- Recovery rate per customer account, per agency
- Residential active 60+ day overdue accounts receivable
- Cumulative accounts receivable reduction
- Residential overdue to a rolling 12-month revenue ratio (accounts receivable)
- Rolling 12-month write-off to rolling 12-month revenue ratio
- Net write-offs per customer
- Average residential active overdue per customer
- Cost per overdue customer

Call Center Operations

- Average handle time per CSR and each of its components: talk time per call, hold time per call, and after-call work time per call
- Unit costs per CSR
- Percent of calls answered within 60 seconds
- First call resolution
- Transactions handled by channel (IVR, online, and CSRs)

Complaints

NJBPU complaints/disputes should be accurately coded and tracked by the following types:

- Dispute issue
- High bill
- Proof of payment
- Bill correction
- Leak adjustment

- Zero usage
- Estimated bill
- Bad debt
- Fees waived
- Misapplied payments
- Termination notices
- Payment arrangements
- Bill explanation

Revenue Protection

- Number of confirmed theft incidents
- Number of confirmed theft incidents per zero consumption field investigation
- Estimated revenue losses from confirmed theft incidents
- Estimated revenue losses from confirmed theft incidents per zero consumption field investigation
- Cost per zero consumption field investigation
- Ratio of number investigated confirmed thefts to non-thefts
- Revenues recovered per zero consumption field investigation
- Future avoided revenue losses per zero consumption field investigation

Contract and Vendor Management

For all vendors:

- Activity volumes
- Variance of actuals compared to service level requirements
- Cost per unit of service

For the after-hours emergency call center vendor:

- CSR total handle time (talk time, hold/transfer time, and follow-up or "back office" time) per call
- CSR total handle time cost per call
- CSR talk time per call
- CSR hold/transfer time per call
- CSR follow-up or back office time per call
- Cost per call

2. Implement an ACO Monthly Performance Report as a basis for ACO performance management meetings that focuses on corrective actions and performance improvements. (See Finding 2)

The ACO VP and the ACO Directors should establish performance management objectives as a basis for developing a new ACO senior level performance report, including:

- Retain the best attributes of existing reports
- Incorporate new metrics
- Align metric accountability and authority
- Design metric tracking and trending methods, with appropriate calendar periods
- Establish targets for each metric and compare actuals using variance analysis
- Target setting should utilize benchmark information from the J.D. Power study and the AWWA benchmarks
- Utilize graphics that focus attention on performance
- Establish clear responsibility for corrective actions and performance improvements that are identified in the report

The monthly report should be assembled by ACO analytic and performance-oriented staff who gather the information from each ACO Director with interactive communication as needed. The report should be the focal point of monthly or more frequent meetings of the ACO VP with the Directors and subject matter experts, as appropriate. The outcome of the meeting should be a reinforcement of current improvement activities and assignment of new action items and should be documented with meeting minutes.

The first page of the report should be a summary that reflects key high level ACO metrics performance and follow-up actions. This summary page can be useful as a report to the next executive management level. The monthly graphs should depict performance relative to targets. The reports should include performance for the current month and compare monthly YTD performance to prior YTD performance, and annual year-to-year performance as well as forecasts for the remainder of the year. The graphs should be accompanied by explanatory and analytic text, including overall objectives, metric definitions, and action items for improvements and corrections.

3. Develop and expand the capability for performance analytic skills within ACO to support performance analysis and management. (See Finding 3)

Increased capability and application of performance analytics is needed to support the ACO VP's commitment to developing a strong performance management ethic. ACO's plan to hire an additional staff resource is commendable. In addition, ACO should evaluate the analytic skills of existing staff, including statistical analysis, Excel expertise, benchmarking studies, business process improvement concepts, unit costing and other ratio analysis, productivity and quality/effectiveness analysis, and tracking and trending tools. ACO should select capable individuals who can begin to provide the additional needed analytic support, and then provide analytics and performance management training. ACO has the most exposure to and influence on customer transactions and therefore has the most potential for improving the customer experience.

4. Restructure Aqua NJ State Opportunities meetings to focus on performance management, improvement, and follow-up actions. (See Finding 4)

Meetings are often the best medium for discussing problems and improvement opportunities, identifying root causes, and developing optimum solutions. Although meetings may be appropriate for sharing information and communicating among individuals representing various organizational units, information sharing is also

efficiently done via emails and periodic reports. A good practice for meeting management necessitates that analysis and discussion leading to opportunities for performance improvement and corrective actions be integral to the preparation, structure, and purpose of meetings.

The monthly "Aqua NJ Scorecard" and the "Aqua NJ State Opportunities Meeting - ACO Report" should provide a basis for identifying performance issues, such as:

- Actuals that underperform compared to the targets
- Actuals that consistently meet or do better than the targets (consider tightening the targets to challenge the metric owner to improve performance)
- Month-to-month and YTD trends that are problematic

The Aqua NJ State Opportunities Meetings are primarily oriented to State Operations and so only the performance metrics that are controllable at the State level should be focused on. For example, the 2017 Aqua NJ Scorecard includes Customer Operations metrics such as "Priority 1 and 2 Aged Service Orders Greater than Seven Days per 10,000 Accounts." State Operations managers and field personnel have direct work involvement that affects this metric. On the other hand, the "Percent of Bad Debt to Total Revenue" is an example where Aqua NJ has little or no direct control.

The "Aqua NJ State Opportunities Meeting – ACO Report" includes CSR Contact Volume by Type. There are ten contact type categories listed, some of which are related to Aqua NJ field work but most of which are not controllable at the field level.

The Chair or facilitator of the meeting should establish an agenda with a handful of key discussions items, with input from the participants, in advance of the meetings. The owners of metrics to be discussed should lead the discussion, root causes of problems should be discussed, and follow-up actions should be committed to. Corrective actions, improvement plans, and other actions should be documented and progress should be discussed at subsequent meetings.

5. Implement improved cost performance management with unit costs. (See Finding 5)

Unit costs are typically expressed as cost per unit of work activity or cost per service or product delivered. Unit costs are used for measuring efficiency and trending will point toward potential unit cost reductions and associated organizational budget category reductions. Unit costs, coupled with internal intra-organizational corporate service metrics and external customer service quality metrics, can be used for understanding the cost impact of delivering improved internal performance as well as customer service, satisfaction, and experience.

Examples of unit costs that should be considered are:

- ACO Cost per Customer
- Average Overdue (cost) per Customer by Type
- Net Write Offs per Customer by Type
- Cost per Overdue Customer by Type
- Cost per Field Service Action

- Cost per Back Office Transaction by Type
- Cost per Complaint by Type
- Cost per Type of Account Served
- Cost per CSR
- Minutes and Cost per Call Type
- Cost per Bill Sent by Type
- Cost per Letter Sent

Performance measurement, whether unit costs or other metrics, is a good practice for all regulated utilities, regardless if costs are allocated from a service company or an outsourced vendor. Unit costs are an important input to measuring productivity and efficiency and controlling O&M expenses.

Unit costs should be linked with the quality metrics so that the "cost to serve" becomes clear. The objective should be to improve the customer experience while understanding the implications to O&M costs. Unit costs will narrow the focus of management's attention on priorities, resource reallocations, and improvement initiatives for long-term achievement of the goals. Tracking and managing unit costs will also help in benchmarking with other utilities and with decisions when evaluating the vendor performance of outsourced services and deciding the appropriate mix of in-house and outsourcing.

ACO should explore the potential for improving performance management with unit costing and other ratio metrics and then implement unit costs as part of the comprehensive need to add new metrics and create a new ACO performance management report.

6. Make benchmarking a new objective and take advantage of existing national benchmarking resources. (See Finding 6)

ACO should join a national peer group or panel of similar utilities or similar functions to compare customer service operations using uniformly defined metrics, to identify leading utility performers, to explore the practices of those better performers, and then to implement changes that will improve performance. ACO will need to develop new or modify existing metrics for apples-to-apples comparisons with the benchmark panel.

One such existing benchmarking program is managed by the American Water Works Association (AWWA). ACO should participate in and utilize the periodic "Benchmarking Performance Indicators for Water and Wastewater Utilities: Survey Data and Analyses Report," published by the AWWA. The report has useful information about service complaints, as well as other typical water utility functions.

ACO should investigate existing gas and electric utility benchmarking programs that ACO can participate in or derive value from. Customer service operations are generally consistent among water, gas, and electric utilities. Aqua Services and State Operations, including Aqua NJ, will benefit from other common gas and electric functions, such as metering, field operations, and administrative functions.

7. Improve ACO contract management and vendor performance and renegotiate or rebid existing contracts including considering alternative vendors. (See Finding 7)

Contract Management

ACO should establish contract management principles, strategies, and processes:

- Establish a process for deciding "make or buy" and assess the costs and benefits of developing functional in-house capability versus outsourcing the function or a combination of the two.
- Assign ownership of each contract to an ACO responsible person who will track vendor performance, identify non-compliance, SLA or performance variances, and correct deficiencies. This same person should participate in the analysis and decision to renew, renegotiate, or rebid the contract, as well as the preparation and drafting of the contract.
- Develop a competitive bidding process and establish a qualified bidders list representing the best national candidates without unnecessary geographic restriction.
- Incorporate contract work definitions tied to performance metrics, including unit costs metrics, quantity and schedule parameters, and quality assurance and quality control metrics with minimum requirements.
- Incorporate monthly or more frequent vendor reporting requirements.
- Manage expired or soon-to-expire contracts for a seamless no-gap transition.
- Use vendor performance history to determine the need for either a cost-effective re-negotiated contract extension or a competitive bidding process.

Contract management and vendor performance should be linked. The contract terms should include SLAs and performance metrics and requirements as a basis for managing vendor performance during the contract duration to correct deficiencies; ensure compliance; and support the renew, renegotiate, or rebid decision.

Renegotiating or rebidding contracts to secure more favorable SLAs and performance requirements and especially rebidding long-term auto-renewed and critical services contracts is necessary at this time for better cost and quality.

Vendor Performance

ACO should actively manage vendor performance:

- Monitor the day-to-day and period-to-period vendor performance, according to the SLA.
- Manage monthly and annual vendor-provided performance reporting, including: (1) work and activities volumes, with associated unit costs, (2) service quality, (3) errors and compliance and, (4) other ratio performance metrics, as appropriate.
- Include vendor performance in the ACO monthly performance reporting, with monthly, YTD, and annual year-to-year trending, variances between vendor performance ACO targets and actuals, for vendors, and commentary that

includes follow-up for corrective actions and performance improvement opportunities.

- Compare vendor performance with analogous in-house functional performance, using comparable metrics and periodically optimize decisions for which functions/services and how much to outsource and to retain in-house.

With respect to the after-hours emergency call center vendor, ACO should incorporate SLA and performance requirements into the contract, including unit cost and other ratio performance metrics. ACO should use these metrics to track the vendor performance from period to period and to compare those metrics with the same metrics for its own call centers for the same type call/transaction content. ACO should use these metrics to assess the costs and benefits of using its call centers to handle some level of after-hours calls or to negotiate with the vendor or rebid the contract to outsource regular-hours calls. The metrics should include:

- ACO IVR metrics related to the emergency option, including IVR authentication success metric, self-service success metric, and containment rates, as appropriate
- Vendor CSR total handle time (talk time, hold/transfer time, and follow-up or "back office" time) per call
- Vendor CSR total handle time cost per call
- Vendor CSR talk time per call
- Vendor CSR hold/transfer time per call
- Vendor CSR follow-up or back office time per call
- Vendor CSR calls per CSR

8. Implement an ACO business process improvement strategy with appropriate process documentation and management tools. (See Finding 8)

Business process analysis, improvement, and management is a strategy of managing and improving business performance by continuously optimizing business processes in a closed loop cycle of modeling, execution, and measurement. Business process management should extract and document information from each ACO business unit.

Performance management good practices include business process documentation and its associated functions, workflows/flowcharts, identification of work products and deliverables, responsible staff, and handoffs among organizational units. Reassess the value of the existing business process documentation management tool and purchase or develop the type of documentation management needed for performance improvement.

J. NON-REVENUE WATER COMPARISON

BACKGROUND

SAGE compared non-revenue water data for Aqua NJ to a panel of four other New Jersey water utilities comprised of Suez Toms River, Suez Water NJ, NJ American, and Middlesex Water, for the period 2011 through 2016.

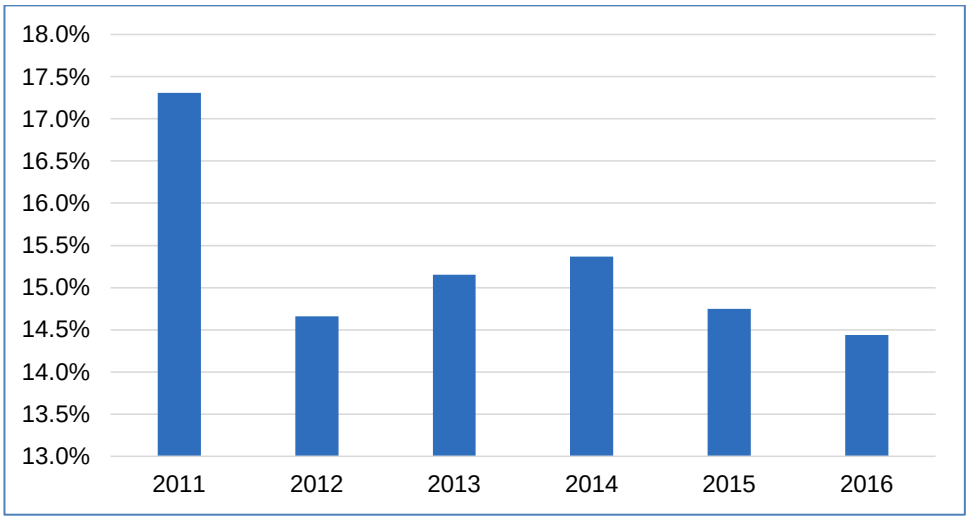
FINDING

1. Aqua NJ non-revenue water has been decreasing and is below the average of other New Jersey water utilities.

That is, there is a smaller difference between water produced and water billed. The following graphs and tables portray the annual percent of non-revenue water for Aqua NJ and the other panel members.

The graph below shows Aqua NJ's non-revenue water for six years:

Aqua NJ Percent Non-Revenue Water

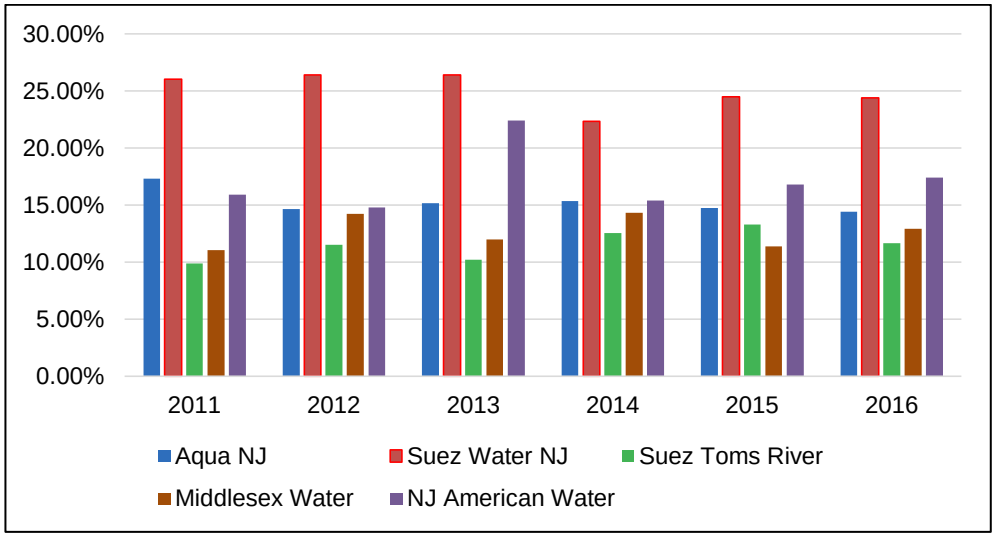


Metric	2011	2012	2013	2014	2015	2016
Percent Non-Revenue Water	17.31%	14.66%	15.15%	15.37%	14.75%	14.44%
System Gallons (thousands)	4,973,360	4,973,481	4,625,032	4,727,260	4,940,016	4,928,268

Aqua NJ reported in its NJBPU Annual Reports that its non-revenue water ranged from a high of about 17% in 2011 to a low of about 14% in 2016. Non-revenue water for Aqua NJ has been declining since 2014.

The graph and table below show non-revenue water reported by Aqua NJ and four other New Jersey water utilities:

Aqua NJ Non-Revenue Water Compared to NJ Panel Utilities

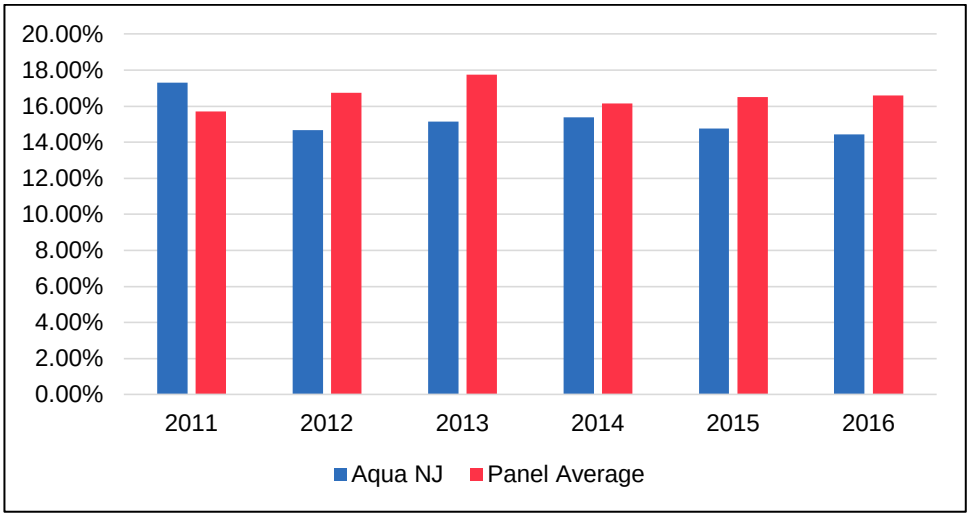


Utility	2011	2012	2013	2014	2015	2016
Aqua NJ	17.31%	14.66%	15.15%	15.37%	14.75%	14.44%
Suez Water NJ	26.04%	26.40%	26.40%	22.37%	24.51%	24.40%
Suez Toms River	9.87%	11.50%	10.22%	12.53%	13.31%	11.65%
Middlesex Water	11.05%	14.23%	12.01%	14.33%	11.40%	12.91%
NJ American	15.90%	14.80%	22.40%	15.40%	16.80%	17.40%

Between 2011 and 2015, Aqua NJ and Suez Water NJ non-revenue decreased while the other utilities non-revenue water increased.

The graph and table below depict the average Aqua NJ non-revenue water compared to the average of the panel.

Aqua NJ Percent Non-Revenue Water Compared to NJ Panel Average



Utility	2011	2012	2013	2014	2015	2016
Aqua NJ	17.31%	14.66%	15.15%	15.37%	14.75%	14.44%
NJ Panel Average	15.90%	14.80%	22.40%	15.40%	16.80%	17.40%

Between 2011 and 2015, Aqua NJ's non-revenue water has declined while the panel average increased.

V. HUMAN RESOURCES

A. BACKGROUND

Aqua New Jersey, Inc. (Aqua NJ) does not have a human resources function. This chapter covers the centralized human resources function of Aqua Services, Inc. (Aqua Services) that provides human resources services to Aqua NJ. The topics covered are:

- Organization, functions, programs, and initiatives that support Aqua NJ
- Aqua NJ's salary and wage compensation and benefits package practices including Aqua America's executive compensation program
- Development, training, and evaluation programs
- Current labor relations status and methodology
- Human Resources department's capability to access personnel information and perform their assigned duties
- Affirmative action and equal employment opportunity (AAEEO) policies, procedures, and functions

ORGANIZATION

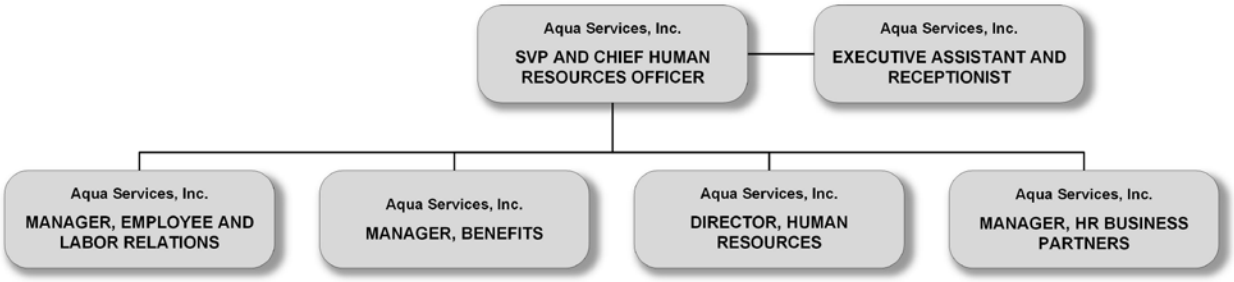
The Human Resources Department is an organizational element of Aqua Services, a subsidiary of Aqua America, Inc. (Aqua America). Human Resources is a shared services function led by the Senior Vice President and Chief Human Resources Officer (SVP-CHRO) who reports directly to the President and Chief Executive Officer (CEO) of Aqua Services, Inc. The SVP-CHRO has the following direct reports:

- Manager, Employee and Labor Relations
- Manager, Benefits
- Director, Human Resources
- Manager, HR Business Partners
- Executive Assistant and Receptionist

The department had 25 positions authorized at the outset of the audit. Of these positions, 22 are geographically officed at the Aqua Services headquarters in Bryn Mawr, Pennsylvania. The remaining three positions are located in Illinois, North Carolina, and Ohio, respectively, and provide human resources services to the Aqua America operating companies in those states.

The top level structure for the Aqua Services Human Resources Department is shown in the following organization chart.

Aqua Services Human Resources Organization Structure



Employee and Labor Relations

The Manager, Employee and Labor Relations has a Workers Compensation and Leave Specialist reporting to him. The unit has responsibility for all union contracts, grievances, and workers compensation matters for Aqua America, including Aqua NJ. Aqua America has 1,600 employees in eight states. The incumbent has been in this position for approximately four years and has considerable experience as a labor relations attorney.

The Manager's main responsibilities are employee relations and the negotiation and enforcement of labor contracts. He divides his time 75% on employee relations and 25% on labor relations. Of the eight states in which Aqua America has operations, Pennsylvania has the greatest number of employees followed by Ohio, North Carolina, Texas, Illinois, Virginia, New Jersey and Indiana. Aqua NJ is represented by only one union, the Service Employees International Union (SEIU).

There are 15 labor contracts across the eight Aqua America state operating organizations. The labor contract duration is typically three to five years, although there is a trend toward five year terms. The contract terms are generally staggered such that there is a manageable negotiation workload. The Manager personally negotiates most of the contracts and works with area management to develop labor contract negotiation strategies. The impacts of changing contract terms to address standing issues are considered. There is also an effort to achieve overall consistency in contract terms among all the Aqua America states.

The Aqua NJ SEIU contract was renegotiated in 2016. Potential contract changes were discussed with the Aqua NJ President and other Aqua NJ management before settling on a particular strategy. In May 2016, once the strategy was decided, the Manager, the President, and the HR Partner for Aqua NJ negotiated the current NJ contract. Agreement was reached in late 2016 with no work stoppages.

Any proposed system acquisitions are reviewed from a labor relations and employee perspective. This includes the target company collective bargaining agreements and the employees' compatibility and ability to assimilate into the Aqua America culture. Public systems often have very different arrangements, including retirement plans, health insurance, and work rules.

Employee and Labor Relations supports the Workers Compensation (WC) program and budgets for the associated costs. The cost of WC claims are allocated to the individual state companies once incurred. A physicians' panel has been established in each Aqua

America state to provide independent medical opinions for such issues as return-to-work and light duty assignments following employee injuries or illnesses.

Union employee compensation is specified in the labor agreement(s) between the specific Aqua America operating company in question and the local union(s) representing the employees. In the case of Aqua NJ, the labor agreement is between Aqua New Jersey, Inc. and Service Employees International Union, Local 32BJ, the sole collective bargaining agent for all of the employees working in the following areas: full-time employees including foremen, service workers, and plant operators employed by Aqua NJ at its New Jersey facilities, but excluding all professional employees, office clerical employees, managerial employees, and supervisors.

The SEIU labor agreement was entered on May 15, 2016 and is effective through May 14, 2020. The agreement covers essentially every aspect of employment for Aqua NJ union employees including, but not limited to, management rights, union rights, seniority, time off, short- and long-term disability, discipline, grievances, transfers and promotions, hours and overtime, leaves of absence, work rules, strikes, licenses/certifications, safety, benefits, and wage scales.

Benefits

The Benefits unit is headed by the Manager, Benefits position. At the outset of the audit this position was vacant and was temporarily filled by a contracted benefits administrator. In July 2017, the position was filled by an experienced hire. There are two subordinate positions in this area, the Benefits Coordinator II and the Benefits Analyst. The Benefits Coordinator II processes new hires into the various benefits programs and the Benefits Analyst performs bill reviews and assists retiring employees with transition.

The Company offers standard medical, dental, eye/vision, and related insurance plans. Providers are reviewed annually for performance.

Medical, dental, vision, and prescription insurance plans are administered by a contractor. The medical plan has four variants: a POS $250 deductible plan, a $1,000 deductible plan, a PPO $500 deductible plan, and a PPO $1,500 deductible plan.

Life insurance and other accident/disability insurance plans are also offered. One of the primary duties of the Benefits Coordinator II is to ensure employee insurance beneficiaries are properly designated on all plans in which the employee participates.

A Flexible Spending Account program is also offered that employees may use to cover medical, family care, parking, and transportation costs with tax deferred savings. Unspent account balances may be rolled over into the subsequent year. This program is administered by a contractor.

An Employee Assistance Program is provided to all employees and their family members.

Aqua America also offers An Employee Stock Purchase Program that is administered by the Finance Department.

A medical insurance program is also offered for retirees. This program is designed to be compatible with Medicare.

A medical insurance plan required by the Consolidated Omnibus Budget Reconciliation Act of 1985 (or COBRA) is also offered to employee dependents when they turn 26 years old and for separating employees. This coverage is available for up to 18 months.

Human Resources

The Director, Human Resources reports to the SVP-CHRO. At the outset of the audit, the Director position was vacant and the SVP-CHRO was interviewing candidates for the position with the assistance of one of the reports to this position, the Supervisor, Talent Acquisition. The Director position has the following direct reports:

- Payroll Supervisor
- Human Resources Assistant
- Generalist, Training and Development
- Supervisor, Talent Acquisition
- Senior Compensation Analyst
- Manager, HRIS

Payroll. The Payroll Supervisor has two subordinates, the Payroll Assistant and the Payroll Coordinator. The Payroll unit was organizationally moved from Finance to Human Resources in June 2017. The SVP-CHRO had previous experience with payroll functions and the changeover to a new Human Resources Information System (HRIS) and a new timekeeping system made relocating Payroll to Human Resources an appropriate change.

The general ledger financial software package is utilized for payroll functions. Additionally, a software package is used to process and pay taxes on payroll for both employee and corporate taxes. Depending on the state, payroll is processed weekly or bi-weekly so the Payroll Department is processing payroll for Aqua America organizations every week. However, the processing load is evenly divided from one week to the next. Although 96% of employees opt for direct deposit of their pay to a financial institution, the remaining four percent opt for hard copy payroll checks. Checks are printed and mailed from the Bryn Mawr corporate office.

Of all the states in the Aqua America family, New Jersey has the most types of payroll taxes. The taxes include: federal and state income tax, Federal Insurance Contribution Act (FICA), Social Security Administration (SSA) Medicare, state disability tax, state work force tax, state health care tax, and state family leave insurance tax. There is a $33,500 upper limit for earnings taxed in New Jersey. A tax software program is required to calculate and administer New Jersey taxes.

Administratively, employee time is input locally by New Jersey employees into the general ledger system master file. Once it is gathered, but prior to payroll processing, the Aqua NJ Controller reviews this data to ensure that hours and rates are properly entered. The general ledger system calculates overtime and double time for non-exempt employees according to calculations based on union contract provisions. Time in excess of 40 hours for exempt personnel cannot be coded into the system.

Employees have the ability to direct their pay to up to five bank accounts. Additionally, they can pay into the Medical Flex plan, transportation, parking, and dependent care as voluntary deductions. Payroll pays into insurance monthly and the 401K weekly on behalf of participating employees as well as into the employee stock purchase program and the United Way.

Human Resources Assistant. The Human Resources Assistant assists with onboarding and coordination of new employee background checks, drug screenings, and eVerify activities. Additionally, the position administers the commercial driver's license program.

Training and Development. The Generalist, Training and Development's responsibilities include training and development, employee engagement, and compliance training. The position also assists with succession planning, onboarding training for new hires, the "Lunch and Learn" training program, and maintaining training records.

Human Resources training and development activities are focused on management and supervisory training whereas operations (field) training is considered technical training and is managed by the state organizations. Safety training is also the responsibility of the individual state organizations as supported by an Aqua Services safety organization under the Chief Operating Officer.

Employee engagement activities include an employee engagement survey originally conducted in 2014 and repeated during the fall of 2017 to gauge employee attitudes. The results of the new survey will be compared with 2014 results to assess engagement progress. Additionally, an Employee Engagement Committee has been established to foster greater employee interest and involvement, and to achieve practical solutions to common problems.

The Generalist, Training and Development also oversees compliance training which is offered to employees online. The following courses were required for all employees in the years shown:

- Doing the Right Thing for Each Other (2014)
- Ethics Refresher and Anti-Harassment (2015)
- Defensive Driving Training (2016)

Equal Employment Opportunity (EEO)/Diversity training is expected to be introduced next year. Compliance training completion is tracked and cognizant managers are advised of employees who are delinquent in completing their training.

The Generalist, Training and Development also assists with succession planning activities. Presently, succession planning is focused on the 30 officer positions in Aqua America including the President, Aqua NJ. The program involves two phases, the first of which includes identifying the competencies required for each specific position; the likely difficulty that will be encountered filling the position, if vacated; and the likely urgency of replacement. Backfilling positions under emergency circumstances is also considered in this phase. The second phase includes developing talent profiles for existing incumbents that identify leadership competencies and other skills. The next steps will include identifying potential successors for some internal positions with

impending vacancies. The intent is to expand the succession planning process to the Director and Manager levels which includes approximately 70 positions.

A budget plan is being developed to support the succession planning program and a tailored development program for each participant has been prescribed. The Aqua America Board was briefed on the program in early August.

Talent Acquisition. The Supervisor, Talent Acquisition has one direct report, the Talent and Organizational Development Coordinator. Key Talent Acquisition functions include the talent acquisition strategy, establishing standards for managers, participation in job interviews, and attendance at industry events and various diversity events. These responsibilities include ensuring the effectiveness of the position requisition process (both new and open positions), job descriptions, compensation evaluation, position approval, and recruiting.

Affirmative Action and Equal Employment Opportunity (AAEEO)

The Supervisor, Talent Acquisition also leads the Diversity and Inclusion efforts for Aqua Services and Aqua NJ. These efforts include a focus on communications and awareness-building activities. The Supervisor regularly interfaces with the Aqua America CEO and the senior leadership team to analyze diversity using market data.

Non-Union Compensation. The Senior Compensation Analyst administers non-union compensation. There are approximately 900 non-union employees in the Aqua America organization.

Non-union compensation programs are based on standard employee classifications of Nonexempt and Exempt described below.

- Nonexempt Employees – Are employees whose work is covered by the Fair Labor Standards Act (FLSA). They are not exempt from the law's requirements concerning minimum wage and overtime.
- Exempt Employees – Are generally managers or professional, administrative, or technical staff who are exempt from the minimum wage and overtime provisions of the FLSA. Exempt employees hold jobs that meet the standards and criteria established under the FLSA by the U.S. Department of Labor.

For non-union employee compensation, a compensation survey developed by a compensation consulting firm is utilized each year to compare and analyze compensation levels. Other surveys, including American Water Works Association (AWWA), Pay Factors, and Computer Serve are also referenced to establish market competitive compensation levels. The annual compensation analysis was underway at the outset of the audit. Aqua Service's policy is to achieve equity generally with the national market as adjusted for regional cost differences. For instance, if the national average for a position is 100, Aqua Services targets a compensation range of 90 for Boardman, Ohio (a lower cost region) to 105 for Hamilton, NJ (a higher cost region).

Performance planning and evaluation for non-union employees includes a twice yearly evaluation, at mid-year and at year-end. These evaluations are intended to reinforce the performance plan and employee engagement as well as demonstrate supervisor focus and interest. A general plan focused on the durable position goals for the ensuing

year is discussed at year-end although plan specifics are not identified. The Company is strict about completing performance appraisal on time and HR Business Partners track completion status.

Human Resources Information System. The Manager, HRIS, position has two HR Analyst position direct reports. The HRIS unit is responsible for maintaining four HR information systems "on the back end," meaning at the HR departmental user level. These systems are all commercial software packages:

- An Aqua Services Human Resource information system of record.
- A system which contains Aqua Service's standard employment and hiring documentation.
- A system used for onboarding new employees.
- A system used to track employee compliance training requirements and completion.

The HRIS unit also designs, develops, and produces various HR reports, both standard reports and ad hoc reports. A standard set of HR reports is produced on a monthly basis for management review and use.

Aqua Services has selected a new HRIS to replace the present system. The selected system is a nationally recognized human resources system. Since the HRIS timekeeping module does not interface effectively with the existing Aqua Services payroll and general ledger system, a new timekeeping system is also being installed to provide the interface between the two systems.

The HRIS and new timekeeping systems are being implemented with a contractor providing the project management for the upgrades. The project kickoff occurred in July 2017 and the effort is being managed in two "waves." Wave One includes the human capital management portion of the upgrade and has been undertaken initially with "go live" scheduled for January 2018. Wave Two, which includes talent acquisition, benefits, and onboarding system modules, is expected to "go live" in August 2018.

Although the existing organization chart depicts the Director, Human Resource position functioning in a traditional human resources leadership role, a new, experienced individual was hired in this position and assigned to oversee the implementation and integration of the new HRIS.

HR Business Partners

The HR Business Partners unit was established in 2016 and is headed by the Manager, HR Business Partners position. The Manager has five direct reports that include a Manager, Human Resources (Illinois); three HR Business Partners II (one located in North Carolina, another in Ohio, and the third in Bryn Mawr); and one HR Business Partner I. The HR Business Partner I position is the HR Business Partner for Aqua NJ; the position is also assigned duties as Business Partner for Finance, IT, and Business Development in the Aqua Services organization. This position is located in Bryn Mawr. The Manager, Human Resources is the HR Business Partner in Aqua Illinois with the Manager title grandfathered from Aqua America's acquisition of the previous entity. Employees in the Business Partner I position have less than five years as an exempt

employee while those in the Business Partner II position have greater than five years in the exempt classification.

The HR Business Partners are responsible for directly interfacing with assigned Aqua America companies in the various states and headquarters organizations. These positions provide front line representation of HR to management and employees in their respective states on a wide variety of human resources activities including:

- Talent acquisition
- Short-term disability
- Long-term disability
- Family medical leave
- ADA matters
- Employee relations
- Labor relations

EXECUTIVE COMPENSATION

Executive compensation matters are overseen by the Executive Compensation Committee of the Aqua America Board of Directors. The Executive Compensation Committee is composed of three directors, whom the Board of Directors have affirmatively determined are independent directors as defined by the New York Stock Exchange (NYSE) listing requirements and applicable Securities and Exchange Commission (SEC) rules. The Executive Compensation Committee operates pursuant to a Board-approved charter which states its duties and responsibilities. The three Executive Compensation Committee members each have extensive electric and gas utility experience.

The Executive Compensation Committee has the power to, among other things, administer and make awards under the Aqua America's equity compensation plans. The Executive Compensation Committee reviews the recommendations of the CEO as to appropriate compensation of the Company's executive officers (other than the CEO) and determines the compensation of such executive officers.

The Executive Compensation Committee reviews and recommends to the Board of Directors the compensation for the CEO, which is subject to final approval by the independent members of the Board of Directors.

Aqua America refers to the executive officers whose compensation is under the purview of the Executive Compensation Committee as its "named executive officers" or "NEOs." The present Aqua America NEO's include the following individuals:

- Christopher H. Franklin, President and Chief Executive Officer
- David P. Smeltzer, Executive Vice President and Chief Financial Officer
- Richard S. Fox, Executive Vice President and Chief Operating Officer
- Daniel J. Schuller, Executive Vice President and Chief Strategy and Corporate Development Officer
- Christopher P. Luning, Senior Vice President, General Counsel, and Secretary

The total of base salary and annual cash incentive compensation of these individuals is referred to as "total cash compensation," and the total of base salary, annual cash incentive compensation, and equity incentive compensation is referred to as "total direct compensation."

Elements of Executive Compensation

The executive compensation program is composed of the following seven elements and sub-elements:

- Base Salary
- Annual Cash Incentive Awards
- Long-Term Equity Incentive Awards that include:
  - Performance Share Awards (shares and options)
  - Restricted Share Awards
- Retirement Benefits
- Non-Qualified Deferred Compensation Plans
- Change-in-Control Agreements
- Stock Ownership Guidelines

Benchmarking the Competitiveness of Executive Compensation

The Compensation Committee retains a compensation consultant to assist in designing and determining the competitiveness of the Aqua America executive compensation program. As part of this process, the compensation consultant develops a market rate for the base salary, total cash compensation, and total direct compensation for each NEO position. The consultant relies on compensation data derived from a benchmarking panel of 61 investor-owned utilities to develop the market rates for Aqua America's NEOs. To adjust market rates to accommodate for variations in company revenues and the cost of goods sold between Aqua America and the 61 utilities forming the benchmarking panel, the consultant performs a regression analysis. This analysis is used to "size adjust" the Aqua America NEO market rates.

The consultant annually reviews the Aqua America executive compensation program for the Compensation Committee and explains the data and analysis described above as well as the proposed actual compensation awards for the NEOs. In 2016, the consultant also analyzed the Company's executive compensation program to ensure that it remained competitive in the market place in relation to the market rate for base salary, total cash compensation, and total direct compensation, including the allocation between cash compensation and equity incentives.

Determination of Actual NEO Compensation

The Compensation Committee determines the actual amount of each element of annual compensation to award to the Company's NEOs with the goal of having the target total direct compensation opportunity for each NEO generally within a range of 15% above or below the market median rate for the NEO's position over time. Base salaries are considered for adjustment annually and adjustments are based on recommendations of the compensation consultant, changes in individual duties and responsibilities, and

other factors. For 2016, the annual increases to the salaries for NEOs averaged four percent.

Actual annual cash incentive awards for NEOs are based on two primary factors: a Company Factor and an Individual Factor. The Company Factor is directly related to the financial performance of Aqua America and ranges from 35% of target (if 75% of the Company's annual financial performance target is achieved), to 125% of target (if 110% or more of the annual financial target is achieved). The Company Factor will be 0% if the Company achieves less than 75% of the annual financial performance target. The financial performance target established as the Company Factor for 2016 for the NEOs was the Company's budgeted annual net income.

The Individual Factor is based on the attainment of individual objectives by each NEO. The Individual Factor ranges from 0% to 150% and is determined based on the individual NEO's performance against separate objectives established each year for each executive, along with discretionary points based on the individual's performance. The individual annual objectives established for the NEOs vary depending on their primary areas of responsibility, but generally include such areas of emphasis as customer growth and strategy, improving customer service, employee safety, cost control, performance improvement, compliance, and revenue improvement. The Compensation Committee and Board of Directors approve the objectives for the Chief Executive Officer, and the Chief Executive Officer approves the objectives and point weighting for each objective for the other NEOs.

For 2016, the Compensation Committee determined that the Individual Factors achieved by the NEOs based on their performance against their objectives and discretionary points ranged from 100% to 150%. The Individual Factors for the NEOs for 2016 were: Christopher H. Franklin—145%; David P. Smeltzer—122%; Daniel J. Schuller—130%; Richard S. Fox—125%; and, Christopher P. Luning—120%.

The following Summary Compensation Table shows compensation paid to or earned by the NEOs in 2016.

2016 Summary Compensation Table

Principal Position	Year	Salary ($)	Grant Date Fair Value of Stock and Option Awards ($)	Non-Equity Incentive Plan Compensation ($)	Change in Pension Value and Non-qualified Deferred Compensation Earnings ($)	All Other Compensation ($)	Total ($)
Christopher H. Franklin, CEO	2016	658,324	1,271,034	862,858	1,017,238	14,645	3,824,099
	2015	483,801	710,830	524,511	405,995	15,043	2,140,180
	2014	339,471	316,764	254,010	571,849	23,205	1,505,299
David P. Smeltzer, CFO	2016	385,663	388,786	275,197	565,493	18,778	1,633,917
	2015	369,037	396,700	265,980	393,970	11,755	1,437,442
	2014	371,296	377,100	268,861	715,175	20,975	1,753,407
Richard S. Fox, COO	2016	338,907	334,954	245,928	237,445	16,863	1,174,097
	2015	255,714	191,295	145,246	93,579	11,003	696,837
	2014	—	—	—	—	—	—
Daniel J. Schuller, EVP	2016	355,143	515,590	268,018	—	20,304	1,159,055
	2015	141,346	160,440	104,271	—	41,697	447,754
	2014	—	—	—	—	—	—
Christopher P. Luning, General Counsel	2016	313,224	305,048	180,306	205,336	14,934	1,018,848
	2015	293,558	277,690	175,500	111,083	14,048	871,879
	2014	278,269	263,970	176,512	174,769	17,787	911,307

The All Other Compensation figures shown above in the 2016 Summary Compensation Table are comprised of the following compensation sources.

All Other Compensation

Name	Year	Dividend Equivalent ($)	Group Life ($)	401(k) Company Match ($)	Relocation ($)	Car Allowance ($)	Other ($)	Total ($)
Franklin	2016	—	3,450	7,950	—	3,245	—	14,645
	2015	—	3,367	7,950	—	3,726	—	15,043
	2014	8.325	1.098	7.800	—	5.982	—	23.205
Smeltzer	2016	—	3,777	7,950	—	7,051	—	18,778
	2015	—	3,581	7,950	—	224	—	11,755
	2014	9.713	3.462	7.800	—	—	—	20.975
Fox	2016	—	3,261	7,950	—	5,652	—	16,863
	2015	—	1,706	5,514	—	3,783	—	11,003
	2014	—	—	—	—	—	—	—
Schuller	2016	—	248	12,009	—	8,047	—	20,304
	2015	—	—	4,106	35,883	1,708	—	41,697
	2014	—	—	—	—	—	—	—
Luning	2016	—	1,055	7,929	—	5,950	—	14,934
	2015	—	990	7,768	—	5,290	—	14,048
	2014	5,550	900	3,588	—	7,749	—	17,787

Changes to the Annual Cash Incentive Award Design for 2017

During 2016, the Compensation Committee, its consultant, and management decided to revise the design of the annual cash incentive portion of the total direct compensation

paid to the NEOs to place more emphasis on financial, safety, and compliance performance metrics and to reduce the weight allocated to individual goals. The changes in 2017 are applicable to all of the NEOs and align the Aqua America goals with payouts dependent upon achievement of certain performance objectives during 2017.

2017 Annual Cash Incentive Metrics and Weighting Factors

Incentive Metric	Metric Components	Weighting Factors
Financial	Earnings per Share	60%
Safety	Predetermined Corporate Safety Metrics	15%
Compliance	Drinking Water and Wastewater Compliance Performance	15%
Individual Goals	Two individual goals are identified for each NEO that align with broader Company goals	10%

Long-Term Equity Incentive Awards

Aqua America utilizes several equity (non-cash) awards to incent its NEOs. These incentive awards are described below.

Performance Share Awards. Performance share or performance share unit grants ("PSU") (together referred to as performance shares) provide the NEO with the opportunity to earn awards of shares based on Company performance against designated pre-determined, objective metrics. In 2017, the Compensation Committee added performance-based stock options to the grants to the NEOs.

Restricted Share Awards. Restricted share or restricted share unit grants (together referred to as "restricted shares") entitle the NEO to receive the number of shares granted at the end of a given period of time, or in increments over a period of years on the anniversaries of the grant date, provided the NEO remains an employee of the Company, unless separation is due to death, disability, retirement, or termination following a Change in Control, in which cases acceleration of the lapse of forfeiture restrictions occurs as set forth in the Plan.

Retirement Plans. Some NEOs are participants in the qualified pension plan (benefits frozen as of December 31, 2014) (the "Retirement Plan"), and in a non-qualified pension benefit plan (the "Non-Qualified Pension Benefit Plan"). The non-qualified retirement plan is intended to provide executive officers with a retirement benefit that is comparable on a percentage of salary basis to that of other employees participating in the Retirement Plan by providing the benefits that are limited under current Internal Revenue Service regulations. Benefits continue to accrue for some of NEOs in the Non-Qualified Pension Benefit Plan. Starting in 2009, the Company began to fund the trust for the benefits under the Non-Qualified Pension Benefit Plan using trust-owned life insurance. A NEO's retirement benefits under the qualified and non-qualified retirement plan are not taken into account in determining the executive's current compensation. Effective December 31, 2014, the NEOs ceased accruing a benefit under the Retirement Plan. Specifically, their plan compensation and credited service

for purposes of determining their benefits was frozen in the Retirement Plan as of December 31, 2014. Vesting service will continue to accrue in the Retirement Plan as long as the NEO remains employed by the Company.

Non-qualified Deferred Compensation Plan. The Company offers a non-qualified Executive Deferred Compensation Plan that allows eligible members of management to defer all or a portion of their salary and annual cash incentives, which enables participants to save for retirement and other life events in a tax-effective manner.

Severance Plans. All NEOs are covered by a severance policy. The policy provides the NEOs with a severance benefit of one full year salary and one full year projected bonus and a minimum of one month of continued medical benefits and a maximum of six months of continued medical benefits following termination, provided that the NEO is terminated for any reason other than for cause or in the event the NEO terminates his employment for good reason, as defined in the employment agreement.

Change-in-Control Agreements. Change-in-control agreements are maintained with the NEOs and are intended to minimize the impacts that could affect key management in the event Aqua America becomes involved in a transaction that could result in a change in control, enable the executives to impartially evaluate such a transaction, provide a retention incentive to the NEOs, and avoid distraction from their duties and responsibilities in the event of a possible change-in-control. Under the terms of these agreements, the covered NEO is entitled to certain severance payments and a payment in lieu of the continuation of benefits if the NEO experiences a termination of employment other than for cause, or in the event the executive resigns for good reason, as defined in the agreements, within two years following a change-in-control of Aqua America.

B. FINDINGS

1. Labor relations are positive between Aqua NJ and its union, the Service Employees International Union Local 32BJ, as evidenced by the limited number of labor issues, including grievances, work stoppages, and work rules disputes.

Other than contract negotiations, there is limited Aqua NJ labor relations interaction with the Aqua NJ union due to the overall paucity of labor issues within the Aqua NJ organization. The SVP-CHRO stated, “Labor relations in New Jersey are good.” and the President, Aqua NJ stated, “There are few labor relations problems in NJ.” The following is a tabulation of grievances since October 2016 filed by Aqua NJ employees and their status.

Aqua NJ Grievances

Date of Grievance	Date of Filing	Nature of Grievance	Status
10/21/2016	11/17/2016	Excessive Discipline	Closed – reduced from written to verbal warning
10/21/2016	11/17/2016	Excessive Discipline	Voided – not escalated to next step in grievance process
3/31/2017	3/31/2017	Recognition of Carry-Over Vacation Hours	Pending

Presently, only one grievance is pending in New Jersey.

2. Aqua NJ workers compensation insurance claims since 2012 have been relatively low and claims costs have been reasonable.

Aqua NJ workers compensation claims have averaged 4.2 events per year for 2012 through the date of the 2017 data reported (August 22, 2017) as shown in the following exhibit.

Aqua NJ Workers Compensation Insurance Claims

Year	Number of Claims	Paid on Claims
2012	4	$11,365.53
2013	6	$5,895.31
2014	6	$19,383.67
2015	2	$2,915.09
2016	4	$32,137.68
2017*	3	$18,375.92
Average	4.2	
*Through August 22, 2017		

The amount paid per claim has averaged $3,603 for this timeframe.

3. The Aqua Services Human Resources Department has placed strong emphasis on its Affirmative Action and Equal Employment Opportunity (AAEEO) program.

This includes analysis of gender, ethnicity, age, and other factors to develop AAEEO understanding and awareness. Recently, a presentation to the Board on diversity and inclusion was delivered that included an analysis of diversity data and likely improvement opportunities along with a plan of action for future improvements. The objective is to have diversity and inclusion in the "Aqua organizational DNA."

Aqua America states its commitment to AAEEO objectives in the following quote from the Employee Handbook.

> *Aqua America, Inc. is committed to providing equal employment opportunity in all of our employment programs and decisions. Additionally, Aqua America, Inc. is*

fully committed to the concept and practice of affirmative action in all aspects of employment. Discrimination in employment on the basis of any classification protected under federal, state or local law is a violation of our policy and is illegal. Equal employment opportunity is provided to all employees and applicants for employment without regard to the following legally protected characteristics: race, color, religion, sex, national origin, age, pregnancy (including childbirth and related medical conditions, including medical conditions related to lactation), physical or mental disability, covered-veteran status, genetic information (including testing and characteristics), sexual orientation, gender identity or expression or any other characteristic protected by applicable local, state or federal law. This policy applies to all terms and conditions of employment, including, but not limited to, recruitment and hiring, placement, promotion, termination, reductions in force, recall, transfer, leaves of absence, compensation and training.

Aqua America further states its commitment to accommodate employees with disabilities in the following.

To comply with applicable laws ensuring equal employment opportunities to individuals with disabilities, the Company will make reasonable accommodations for the known physical or mental limitations of an otherwise qualified individual with a disability who is an applicant or an employee unless undue hardship and/or a direct threat to the health and/or safety of the individual or others would result. Any applicant or employee who requires an accommodation in order to perform the essential functions of his/her job should contact Human Resources and request such an accommodation. The individual with the disability should specify in writing what barriers or limitations make it difficult for him or her to perform the job. The Company will engage in the interactive process in compliance with applicable law and conduct an investigation regarding these barriers or limitations and will then identify possible accommodations, if any, that will help to eliminate the barrier(s) or limitation(s). If the accommodation is reasonable and will not impose an undue hardship on the Company and/or a direct threat to the health and/or safety of the individual or others, the Company will make the accommodation. The Company may also propose alternative accommodation.

The Company will also consider requests for reasonable accommodations for medical conditions related to pregnancy and childbirth where supported by medical documentation.

4. Numerous staffing vacancies exist in key positions within the Aqua Services Human Resources Department and attrition in key positions has disrupted the continuity of the Department.

In June 2017, at the outset of the audit, eight of 25 or 32% of the authorized positions in the Aqua Services Human Resources Department were vacant including:

- Director, Human Resources
- Manager, Benefits

- Manager, HRIS
- Workers Compensation and Leave Specialist
- Payroll Coordinator
- Human Resources Assistant
- Senior Compensation Analyst
- HR Analyst

Later in 2017, three additional Human Resources employees terminated including the SVP-CHRO, the HR Business Partner I serving Aqua NJ, and an HRIS Analyst. The departure of the SVP-CHRO was particularly disruptive as it occurred amid several important human resources initiatives including the HRIS replacement project and succession plan development, and at a time that high levels of HR staff attrition were already occurring.

Presently, the duties of the SVP-CHRO have been temporarily split and reassigned, pending filling the position. The Sr. Vice President, General Counsel and Secretary has been assigned temporary responsibilities for the benefits, employee, and labor relations functions, while the Vice President, Chief of Staff and Investor Relations has been assigned temporary responsibilities for the remaining human resources functions. The qualifications of these individuals to lead the Human Resources Department are unclear as is the impact of these temporary assignments on their primary duties.

Although recruiting and hiring activities were undertaken in 2017 that resulted in nine new hires, there were also nine terminations, and six positions that remain unfilled including the SVP-CHRO position. Overall, the leadership structure in the Human Resources department has been disrupted with the numerous vacancies and departures of key personnel up and down the department ranks. Similarly, the hiring and integration of new employees is time consuming, disruptive, and inefficient, particularly when experienced leadership is not present to guide these activities. The impact of this situation is unlikely to be beneficial in the long term.

5. Aqua Services Human Resources lacks a proactive, comprehensive, and thoughtfully-designed training and development program.

Human Resources is responsible for training and development activities other than technical and safety training which are the responsibilities of the individual state operating companies. However, Human Resources has no consolidated training policy or guidance describing the training program, its objectives, criteria, or methodologies.

The SVP-CHRO and the Generalist decide on training topics with input from senior staff members. Rather than identifying new training through a training needs analysis, training requirements are normally identified through requests and sometimes through informal surveys. The focus is on reactive training.

New training courses are usually developed by outside training consultants and recent training and development initiatives have included the use of contracted “engagement coaches” to assist with Officer/Director level employee development. Additionally, offsite training activities are periodically held for management development.

Aqua America specifically identified the following management training activities that are conducted:

- Presidents' Management and Leadership Meeting is held semiannually to bring all state presidents and senior leaders together to discuss current and emerging issues and strategies.
- 360 Degree Assessments are conducted every three years for all supervisory and management personnel. Group sessions are held to share ideas and best practices and provide valuable feedback.
- Finance Conference brings state controllers and senior staff together to share best practices and learn new skills and accounting regulations.
- Operations and Engineering Summit is held to share best practices and learn new techniques and regulations that affect different industry sectors.
- The Company is a member of the Institute for Management Studies and encourages senior level employees to participate in these programs.

Additionally, a "Lunch and Learn" training program is held quarterly and is offered on a voluntary basis to interested employees. The sessions are offered live as well as by Webex and telephonically for remote attendees. Recent topics have included rate making and water purification in third world countries.

Management and employee training provided specific to Aqua NJ has included the following since 2014:

- For the top seven leaders in NJ:
  - 2014: Leadership Training
  - 2015: Leadership Training
- Required Training for All Aqua NJ Employees:
  - 2014: Doing the Right Thing for Each Other
  - 2015: Ethics Refresher and Anti-Harassment
  - 2016: Defensive Driving Training

Additionally, management labor contract training on the recently approved Aqua NJ union contract is in progress.

The current training courses described are more an amalgamation of individual initiatives than an intentionally designed training and development program. They do not appear to relate closely to company or employee job needs. Further, in several cases the "courses" appear to be nothing more than regularly scheduled management meetings rather than designed training sessions. In most cases, the basis for the training is implied, the objectives are not identified, and the effectiveness of the training is unmeasured. An example is the Lunch and Learn program. It is a voluntary program and should not be considered an element of the Company training program.

6. The Aqua Service's Annual Employee Performance Evaluation (Form B) process for non-union employees is poorly defined and lacks specific employee performance improvement planning.

Performance planning and evaluation for non-union employees includes a twice yearly evaluation – at mid-year and at year-end. These evaluations are intended to reinforce the plan and employee engagement as well as demonstrate supervisor focus and interest. A general plan focused on the durable position goals for the ensuing year is discussed at year-end although plan specifics are not identified. The performance evaluation form alludes to a Performance Action Plan to be completed if the employee is assigned a "1" performance rating (lowest possible). However, employee performance improvement objectives and plans for other than the poorest performing employees are not required to be identified on the evaluation.

7. Aqua Services Human Resources Department lacks expected policy, procedure, and process documentation needed to effectively manage its functions.

Numerous routine policies, procedures, and records that would be expected to be maintained by a utility human resources organization were not available, were not produced, or insufficiently addressed the topic. These include:

- Compensation policy
- Training policy and training procedures
- Training plans and schedules
- Employee evaluation policy and procedures
- Labor relations policy and procedures
- Human resources processes
- Payroll manual

The availability of policies, procedures, and process documentation is important for human resources employees to reference and, under the present circumstances of unusually high human resources staff turnover, is critical to maintaining continuity and acceptable service levels throughout the Aqua Services organization.

8. The Aqua Services organizational structure has more management levels (echelons) than desirable.

One important element in efficient organizational structures is the number of management levels (echelons) that exist from the executive level to the non-supervisory level in the organization. A structure with many management levels is likely to be characterized by slower decision-making, slower response, and less than optimum efficiency. A broader, flatter structure with fewer management levels is likely to have timelier decision-making, better responsiveness, and greater overall efficiency. Generally, large organizations with complex operations have more management levels than small organizations with comparatively less complex operations.

The management levels for the Aqua Services departments have been analyzed and the following table provides the number of levels for each department.

Management Levels by Aqua Services Department

Aqua Services Department	Management Levels
Finance	7
General Counsel	4
Chief of Staff and Investor Relations	3
Strategy and Corporate Development	3
Regulated Operations	5
Human Resources	4
Regulatory, Government, and External Affairs	3

The number of management levels ranges from three to seven levels. Based on experience, there are more management levels than desirable.

9. The spans of control for the Aqua Services organization structure are often well below the expected span of control range for a utility of its size and complexity.

Another important element in organizational structure is the spans of control within the structure. Span of control is normally defined as the number of employees reporting to an individual supervisor. Although there are no generally accepted guidelines for the industry, for most utility organizations spans of control ranging from as few as six direct reports up to 20 direct reports for a full-time manager or supervisor are practical. There are, however, several variables that affect the appropriate span of control in each specific circumstance including:

- Diversity of functions supervised
- Number of physical locations or mobility of employees
- Supervisory degree of involvement in subordinates' work
- Experience levels of the superior and subordinate
- Complexity of work planning required

These same variables apply in instances where a supervisor performs dual roles as a supervisor and as an individual contributor, adjusted in proportion to the extent of the manager's individual contribution. Spans of control that are too broad can also create problems such as inconsistent performance and inadequate supervision.

The spans of control for Aqua Services have been analyzed and the results are shown in the following table. The results include the average span of control for each Aqua Services management level as well as a composite organizational average. The high and low spans of control within each management level are also included in the analysis.

Aqua Services Spans of Control Analysis

Title	Number of Supervisors	Number of Reports	Average Span of Control	High Span	Low Span	Supervisors with Less Than Six Reports
Echelon 1 – CEO	1	8	8.0	8	8	0
Echelon 2 – EVP/SVP/Officer	8	24	3.0	6	1	7
Echelon 3 – Vice President	15	53	3.5	6	1	12
Echelon 4 – Director	16	44	2.8	6	1	14
Echelon 5	15	72	4.8	11	2	10
Echelon 6	18	68	3.8	8	1	14
Echelon 7	5	88	17.6	27	4	1
Totals:	**78**	**358**	**4.6**	**27**	**1**	**58**

The simple average span of control for the Aqua Services organization is 4.6 employees per supervisor, a number considerably lower than desirable. Only the Chief Executive level (Echelon 1) and lowest organizational level (Echelon 7) have spans of control considered to be suitable. In fact, without these levels increasing the overall average, the average span of control for Echelons 2 through 6 is 3.6 employees per supervisor.

10. The Executive Compensation Committee's annual benchmarking of the competitiveness of the Aqua America's executive compensation is flawed and makes comparisons that are not appropriate for water and wastewater industry executives.

The Executive Compensation Committee performs an annual benchmarking of executive compensation to assess the competitiveness of the Company's executive compensation. This benchmarking makes comparisons between the Company's executive compensation levels and the executive compensation levels of 61 other investor-owned utilities in an industry compensation database used by the Committee's compensation consultant. The 61 companies that comprise the compensation database are listed below.

Utility Industry Compensation Database

Utility Companies Included in The Utility Industry Database Used by The Executive Compensation Committee's Compensation Consultant	
AES	NiSource
AGL Resources	North Western Energy
Allete	NW Natural
Alliant Energy	OGE Energy
Ameren	Oncor Electric Delivery
American Electric Power	ONE Gas
Atmos Energy	Otter Tail
Avista	Pacific Gas & Electric
Berkshire Hathaway Energy	Peoples Natural Gas
Black Hills	Pinnacle West Capital
CenterPoint Energy	PNM Resources
CH Energy Group	Portland General Electric
Cleco	PPL
CMS Energy	Public Service Enterprise Group
Consolidated Edison	Puget Sound Energy
Dominion Resources	Questar
DTE Energy	SCANA
Duke Energy	Sempra Energy
Edison International	Southern Company Services
El Paso Electric Co.	Southwest Gas
Energy Future Holdings	TECO Energy
Entergy	Tennessee Valley Authority
Exelon	UGI
FirstEnergy	UIL Holdings
Iberdrola USA	Unitil
Idaho Power	UNS Energy
Indianapolis Power & Light Company	Vectren Corporation
ITC Holdings Corp.	Westar Energy
LG&E and KU Energy Services	Wisconsin Energy
MDU Resources	Xcel Energy
NextEra Energy	

Annually, the Committee's compensation consultant develops a market rate for base salary, total cash compensation, and total direct compensation for each of the Aqua America NEO positions, including the allocation between cash compensation and equity incentives. Each market rate represents the median compensation level that would be paid to a hypothetical, seasoned performer in a position having similar responsibilities and scope, in an organization of similar size and type as the Company.

The Compensation Committee believes that utilizing the data from only utility companies and adjusting the Company's revenues as described below, to better align the Company's data with the data in the utility industry compensation database, provides an appropriate comparison for determining the market rates for the Company's NEOs, given that Aqua America is primarily a utility company. Also, due to the relatively limited number of investor-owned water utility companies of the Company's size, the Compensation Committee believes that using the broader utility market data provides reasonable and reliable data for determining competitive compensation levels.

In analyzing the competitiveness of Aqua America's executive compensation, consideration is given to the notion that compensation levels for executives of companies are often correlated with a company's size as defined by revenues. That is, executives in companies with higher revenues are generally paid more than executives with comparable positions in companies with lower revenues. The Compensation Committee and its consultant have concluded that the Company's revenues under-represent the complexity and scope of the Company's business given the Company's low cost of goods sold relative to energy-based utilities. They maintain that cost of goods sold as a percentage of revenues is more significant for energy-based utilities due to their fuel, gas, and other power costs. The Company, like other water utilities, does not have commodity costs as high as most energy-based utilities. To adjust for this difference in revenues and cost of goods sold, the compensation consultant performed an adjusted revenue analysis. This analysis is designed to create a consistent comparison to the compensation data in the 61 utility compensation database by estimating the revenue that the Company would earn if its cost of goods sold was in similar proportion to that of the energy-based utilities that constitute the majority of the companies in the database.

Using revenue and cost of goods sold data from the 61 company compensation database, the consultant performed a complex regression analysis to size-adjust the benchmark data to determine market rates for base salary, total cash compensation, and total direct compensation for each NEO. In some cases, tabular data was used where regression data was unavailable due to insufficient correlation between officer positions in the Company and the companies in the database and/or limited sample size to ensure the accuracy of the regression analysis. The consultant utilized this methodology to determine what the 61 companies in its database would pay at the median for positions comparable to those of the Company's NEOs.

The Compensation Committee considers target total direct compensation levels that are within a range of 15% of the market median rates developed by the consultant for each position to be competitive. Payouts of prior cash incentives and changes in the value of equity incentives granted in previous years are not taken into account in determining the amounts of current awards because annual incentives are intended to reward annual performance and the Compensation Committee makes grants of equity incentives based on their grant date value and the applicable competitive benchmarks for each NEO's position.

The comparison described above, however, is not an objective comparison because none of the 61 investor-owned utilities in the compensation database is engaged in either the water or wastewater business, Aqua America's primary business lines. In

fact, the companies in the compensation database are essentially all energy companies engaged in either the electric utility or natural gas utility businesses or both. The difference in compensation between these utilities and Aqua America is not so much due to the difference in cost of goods sold as it is to the significant difference in the complexity of their operations. The database listing is comprised of numerous utilities that operate large fleets of nuclear and/or fossil power plants, have extensive renewable resource investments, and operate multi-state electric and gas transmission facilities as well as multi-state distribution operations. The complexity of these electric and gas operations clearly exceeds that of Aqua America's water and wastewater utility operations. Thus, attempting to draw an equivalence in executive compensation between the executives leading these utilities and Aqua America's executives is not appropriate.

11. The actual 2016 cash incentive compensation for Named Executive Officers (NEOs) substantially exceeded the cash incentive compensation targets set by the Compensation Committee for all NEOs, ranging from 26.0% to 52.2% above the individual cash award targets.

The Compensation Committee selected a target annual incentive percentage for each NEO so that the executive's target total cash compensation, consisting of base salary and target annual cash incentive, when combined with the executive's target equity incentives, is generally in a range of 15% above or below the total direct compensation for the market median rate for that position. The target annual incentive percentage for 2016 as a percentage of base salary for each of the NEOs is shown in the table below along with the 2016 actual cash incentive award.

2016 Target Cash Incentive Awards

Name	2016 Target Bonus Percent	2016 Target Cash Incentive Award	2016 Actual Cash Incentive Award	Percentage Cash Incentive Award Exceeds Target
Franklin	85%	$566,738	$862,858	52.2%
Smeltzer	55%	$214,830	$275,197	28.1%
Fox	55%	$187,374	$245,928	31.2%
Schuller	55%	$196,350	$268,018	36.5%
Luning	45%	$143,100	$180,306	26.0%

C. RECOMMENDATIONS

1. **Aqua Services leadership should perform an objective review of the circumstances involved with the staffing turbulence in the Human Resources Department, identify the root cause(s) for it, and solve the problems. (See Finding 4)**

The review should include an analysis of former employee exit interview documentation, interviews of current employees who have held positions in the HR Department for a relatively long time, and analysis of recent employee engagement survey results in the HR Department to gain possible insight into the root cause(s) for the departure of so many employees. Once identified, a corrective action plan should be developed to eliminate the root cause(s) and prevent recurrence of similar situations.

2. **Human Resources should design and implement a thoughtful, comprehensive training and development program. (See Finding 5)**

The program should focus on all aspects of training and development for which Human Resources is responsible. This would include new-hire onboarding training, employee compliance training, and supervisory/management training. The program content should be based on training needs assessments for each category of trainee (new-hire, employee, supervisor, and manager). Each training program element should be based on stated objectives and benefits, and training effectiveness should be measured.

3. **Human Resources should enhance the Employee Performance Evaluation process to include development of collaborative employee performance improvement plans developed by each employee and the evaluating supervisor. (See Finding 6)**

Performance improvement planning should not be limited to poor performers, but should be utilized in evaluating all employees, even high performers. It is also an important element in the succession planning and related employee development programs.

4. **Human Resources should conduct a thorough and objective upgrade of its policy, procedure, and process documentation to address the obvious deficiencies that exist and to ensure the continuity of its human resources management capabilities as well as to sustain service levels. (See Finding 7)**

Policies, procedures, and process documentation must be available to train human resources employees, to maintain continuity and consistency, and ensure acceptable Human Resources service levels.

5. **Restructure the Aqua Services organization to enhance efficiencies by eliminating unnecessary echelons and increasing spans of control. (See Findings 8 and 9)**

Reducing organizational echelons to between three and five layers in each major department and increasing spans of control to at least an average of six employees per supervisor are suggested.

6. **The Executive Compensation Committee should consider making compensation comparisons with other water and wastewater enterprises when benchmarking the competitiveness of Aqua America NEO compensation. (See Finding 10)**

Numerous water and wastewater enterprises (both public and private) manage operations similar in scope and complexity to those of Aqua America. Executive compensation benchmarking should utilize data from such organizations rather than data from electric and gas utilities. Analyses to adjust company revenues and cost of goods to "true up" the benchmark comparisons should be eliminated from the process.

7. **To achieve actual cash incentive awards to NEOs that are aligned with the targets set by Executive Compensation Committee, the Committee should consider establishing performance objectives that are more challenging for NEOs. (See Finding 11)**

More effective management of the NEOs' cash incentive awards is indicated by the actual cash incentive payouts made in 2016. More challenging performance objectives for NEOs are indicated.

VI. FINANCE AND ACCOUNTING

A. BACKGROUND

This chapter covers the Aqua New Jersey, Inc. (Aqua NJ) finance, accounting, information technology, and internal audit functions under the following sections:

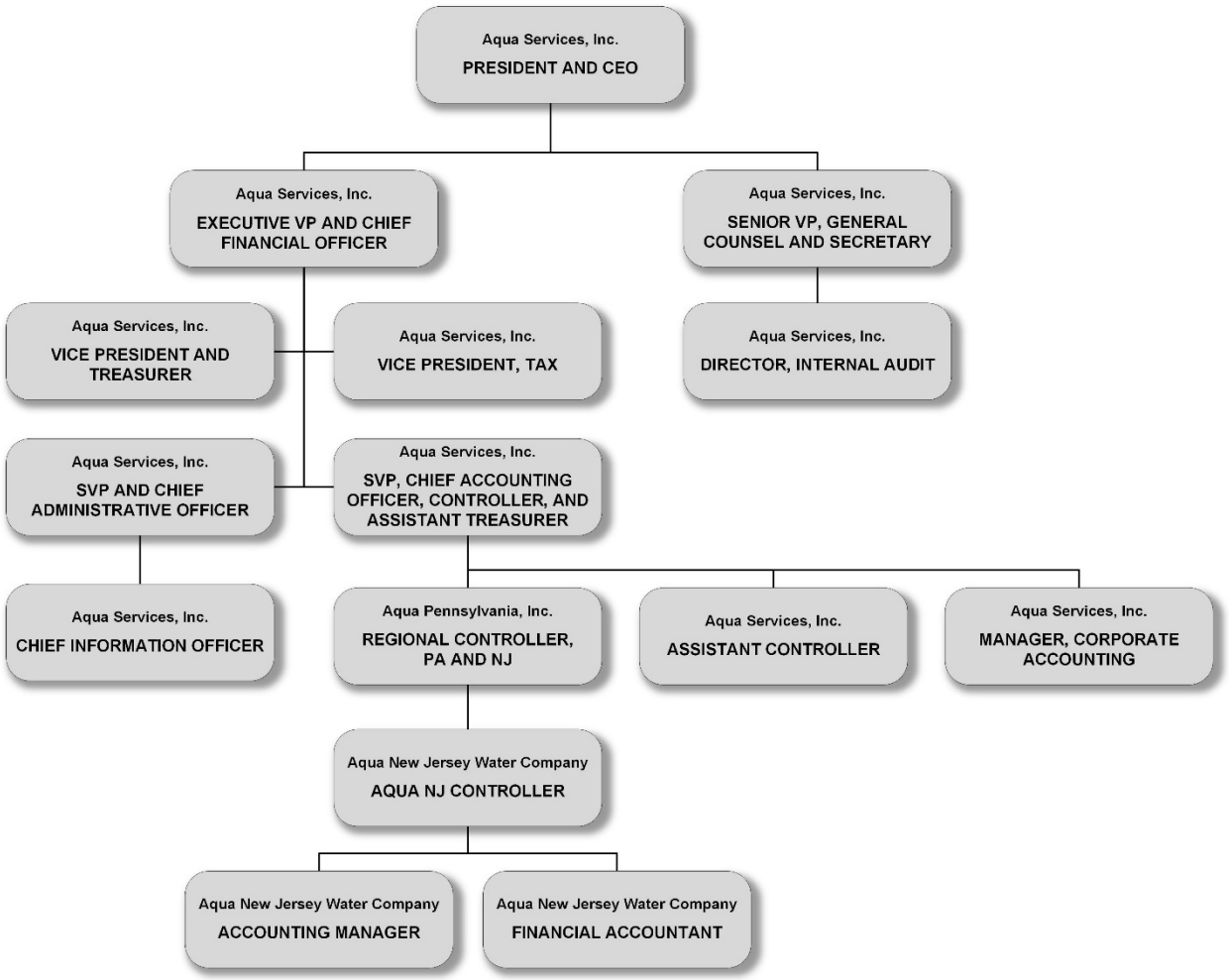
- Organization
- Financial Management
- Accounting
- Budgeting and Planning
- Information Technology
- Internal Audit

ORGANIZATION

Finance, accounting, information technology, and internal audit functions are all provided to Aqua NJ by its affiliate, Aqua Services, Inc. (Aqua Services) and Aqua Pennsylvania, Inc. (Aqua Pennsylvania). Aqua NJ has three accounting employees but has no finance, information technology, or internal audit employees.

The finance, accounting, information technology, and internal audit functions performed by Aqua Services and Aqua Pennsylvania for Aqua NJ are contained in the departments under the Executive Vice President and Chief Financial Officer (CFO). The Internal Audit function reports to the Senior Vice President, General Counsel, and Secretary (General Counsel). These organizational units are shown in the following organization chart.

Aqua NJ Finance and Accounting Organization Structure



The current organization structure has been in place since July 2015 when the former Chief Executive Officer (CEO) retired and the new CEO took office. At that time, an executive who reported to the CEO and who was in charge of Information Technology, Fleet, Supply Chain, and the capital program retired. That position was eliminated and a new Chief Administrative Officer position reporting to the CFO was created to supervise the Customer Service, Information Technology (IT), Fleet, and Supply Chain functions. At the same time, the Vice President for Legislative, Public Affairs, and Regulatory Counsel position began reporting directly to the CEO instead of the CFO. Investor Relations reports directly to the CEO, although the CFO is involved in investor relations presentations.

Finance and accounting functions that are located at the Aqua NJ headquarters in Hamilton, New Jersey include the Aqua NJ Controller and two staff. The primary duties of the staff include, but are not limited to, financial statement preparation, variance analysis, property accounting, internal monthly, quarterly and annual reporting, metrics tracking, as well as assisting the Controller with budgeting and forecasting. The Aqua NJ Controller has a dotted line reporting relationship to the Aqua NJ President and a

direct reporting relationship to the VP, Regional Controller, Pennsylvania and New Jersey.

FINANCIAL MANAGEMENT

Aqua NJ's treasury functions, including cash management and corporate finance, are provided by the Aqua Services Treasury Department, with coordination with Aqua NJ's Controller. Cash receipts and payments are processed daily through Aqua America's main bank account and are tracked as intercompany transactions between the parent and each subsidiary, including Aqua NJ. The net result of cash needs versus receipts is recorded as an adjustment to intercompany investments in each subsidiary and is cleared monthly as an adjustment to Aqua NJ's Equity.

Financial Operating Results

Aqua NJ's income statement for the past five years (2012–2016) is summarized in the following table.

Aqua NJ Income Statements
For Years Ended December 31
($000)

Income Statement Category	2012	2013	2014	2015	2016	Percent Change 2012–2016	CAGR[1] 2012–2016
Operating Revenue	37,637	37,382	39,346	42,981	44,352	17.8%	4.19%
Utility Cost and Expense	25,566	26,997	26,833	28,516	29,415	15.1%	3.57%
Operating Income	12,071	10,385	12,513	14,465	14,937	23.7%	5.47%
Other (Income) Expense	2,763	2,776	2,754	2,956	2,879	4.2%	1.03%
Income Before Tax	9,308	7,609	9,759	11,509	12,058	29.5%	6.69%
Tax	3,204	2,617	3,868	3,604	4,238	32.3%	7.24%
Net Income	6,104	4,992	5,891	7,905	7,820	28.1%	6.39%
[1] Compound Average Growth Rate							

Net Income increased by approximately 28% during this five-year period, a compound average growth rate (CAGR) of 6.39%. This was achieved because operating revenue increased at a faster rate than utility cost and expense (CAGR of 4.19% compared to a CAGR of 3.57%).

The amount of revenue associated with each classification of customer for the past five years is shown in the following table.

Aqua NJ Operating Revenue per Customer Classification ($000)

Customer Classification	2012	2013	2014	2015	2016	Percent Change 2012–2016	CAGR 2012–2016
Residential	24,476	23,521	24,528	26,685	27,646	13.0%	3.1%
Commercial	4,416	4,274	4,476	5,183	5,298	20.0%	4.7%
Public	579	615	601	598	606	4.7%	1.1%
Industrial	462	559	487	564	578	25.1%	5.8%
Fire Protection	3,343	3,414	3,515	3,577	3,593	7.5%	1.8%
DSIC and other surcharges[1]	0	546	1,025	865	1,080	N/A	N/A
Other Water revenues	171	182	205	205	274	60.2%	12.5%
Net Operating Water Revenues	33,447	33,111	34,837	37,677	39,075	16.8%	4.0%
Non-Operating Utility Revenue	768	824	794	1,135	963	25.4%	5.8%
Sewer Revenue	3,422	3,447	3,715	4,169	4,314	26.1%	6.0%
Total Operating Revenues	37,637	37,382	39,346	42,981	44,352	17.8%	4.2%

[1] Distribution System Investment Charge and other infrastructure surcharges that allow a recovery of capital infrastructure investment for system improvements and enhancements.

The compound annual growth rate for the largest customer categories based on revenue (residential and commercial) was modest over the five-year period, averaging 3.1% and 4.7%, and was reflected in the growth rate for total operating revenues (4.2%).

Aqua NJ water sales for the past five years for each of its customer classifications are shown in the following table.

Aqua NJ Water Sales
(Million Gallons)

Customer Classification	2012	2013	2014	2015	2016	Percent Change 2012–2016	CAGR 2012–2016
Residential	3,088	2,859	2,887	3,049	3,039	−1.6%	−0.4%
Commercial	408	379	382	402	413	1.2%	0.3%
Metered Public	47	42	42	44	43	−8.5%	−2.2%
Metered Industrial	81	75	77	80	83	2.5%	0.6%
Fire Protection	615	568	573	605	597	−2.9%	−0.7%
DSIC							N/A
Other Water Revenues	42	35	39	41	42	0.0%	0.0%
Total Water Sales	4,281	3,958	4,000	4,221	4,217	−1.5%	−0.4%

Water usage over the past five years stayed constant, with only modest changes as reflected in the compound annual growth rate for all categories of customers, except for metered public being less than 1% in either direction and total water sales declining by an average annual rate of 0.4%.

Dividing Aqua NJ water revenue for each of the customer classifications by the number of gallons of water sales for that class yields the revenue per gallon for each customer classification as shown in the following table.

Aqua NJ Revenue per Gallon of Water Sold
($)

Customer Classification	2012	2013	2014	2015	2016	Percent Change 2012–2016	CAGR 2012–2016
Residential	0.0079	0.0082	0.0085	0.0088	0.0091	14.8%	3.6%
Commercial	0.0108	0.0113	0.0117	0.0129	0.0128	18.5%	4.3%
Metered Public	0.0123	0.0146	0.0143	0.0136	0.0141	14.4%	3.5%
Metered Industrial	0.0057	0.0075	0.0063	0.0071	0.0070	22.1%	5.3%
Fire Protection	0.0054	0.0060	0.0061	0.0059	0.0060	10.7%	2.7%
DSIC	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Other Water Revenues	0.0041	0.0052	0.0053	0.0050	0.0065	60.2%	12.2%
Total Water Sales	0.0078	0.0084	0.0087	0.0089	0.0093	18.6%	4.5%

Aqua NJ's revenue per gallon showed modest annual growth rates, reflecting the rate increases granted in 2014 (3.27%) and 2016 (0.53%).

The table below presents the number of Aqua NJ customers by customer classification for the past five years, with the percent change from 2012 to 2016 and the compound average growth rate for the five-year period.

Aqua NJ Number of Customers

Customer Classification	2012	2013	2014	2015	2016	Percent Change 2012–2016	CAGR 2012–2016
Residential	48,184	48,380	48,790	49,068	49,586	2.9%	0.7%
Commercial	2,370	2,385	2,415	2,456	2,448	3.3%	0.8%
Metered Public	38	39	38	39	39	2.6%	0.7%
Metered Industrial	107	107	107	106	109	1.9%	0.5%
Fire Protection	373	382	394	397	402	7.8%	1.9%
Other	6	6	6	6	6	0.0%	
Total Water Customers	51,078	51,299	51,750	52,072	52,590	3.0%	0.7%
Sewer	5,435	5,616	5,953	5,994	6,049	11.3%	2.7%
Total Metered Customers	56,513	56,915	57,703	58,066	58,639	3.8%	0.9%

The number of customers in all customer classifications remained relatively static over the past five years, with only sewer and fire protection customers increasing at an average annual rate above one percent.

The average revenue per customer for the five-year period plus the percentage change from 2012 to 2016 and the compound average growth rate are shown in the following table.

Aqua NJ Revenue per Customer ($)

Customer Classification	2012	2013	2014	2015	2016	Percent Change 2012–2016	CAGR 2012–2016
Residential	508	486	503	544	558	9.8%	2.4%
Commercial	1,863	1,792	1,853	2,110	2,164	16.2%	3.8%
Metered Public	15,237	15,769	15,816	15,333	15,538	2.0%	0.5%
Metered Industrial	4,318	5,224	4,551	5,321	5,303	22.8%	5.3%
Fire Protection	8,962	8,937	8,921	9,010	8,938	−0.3%	−0.1%
Other	28,500	30,333	34,167	34,167	45,667	60.2%	12.5%
Total Water Customers	655	645	673	724	743	13.5%	3.2%
Sewer	630	614	624	696	713	13.3%	3.1%
Total Metered Customers	652	642	668	721	740	13.4%	3.2%

The average revenue per customer increased only slightly over the past five years (3.2% compound average growth rate for water customers and 3.1% compound average growth rate for sewer customers), reflecting the relative consistency in the number of customers and gallons of water sold and the slight increase in water rates in 2014 and 2016.

Aqua NJ's capital expenditures for the past five years are shown on the following table.

Aqua NJ Capital Expenditures ($000)

	2012	2013	2014	2015	2016	Total	Average
Capital Expenditures	8,704	16,268	13,250	21,680	17,530	77,432	15,486

Aqua NJ's capital expenditures totaled over $77 million in the past five years, an average of $15.5 million per year. Comparing this capital spending to the number of Aqua NJ customers over the same period of time yields the average capital spend per customer as shown in the following table.

Aqua NJ Capital Expenditures per Customer

Customer Classification	2012	2013	2014	2015	2016
Capital Expenditures ($000)	8,704	16,268	13,250	21,680	17,530
Total Metered Customers	56,513	56,915	57,703	58,066	58,639
Capital Expenditures per Metered Customer ($)	154	286	230	373	299

The average capital expenditure per metered customer increased from $154 in 2012 to $299 in 2016 with a high of $373 in 2015.

Capitalization

Throughout the last five years, 2012–2016, Aqua NJ reported no short-term debt or preferred stock. Its capital structure was comprised of long-term debt and common stock. Aqua NJ's capitalization for each of the last five years is shown in the following table.

Aqua NJ Capitalization ($000)

Capitalization	2012	2013	2014	2015	2016
Long-term Debt	56,234	55,703	57,471	56,772	63,782
Short-term Debt	0	0	0	0	0
Preferred Stock	0	0	0	0	0
Common Equity	52,290	68,437	71,750	82,586	82,400
Total Capitalization	**108,524**	**124,140**	**129,221**	**139,358**	**146,182**

During this period, long-term debt increased by $7.5 million or 13%, while common equity increased by over $30 million or almost 58%. These capitalization amounts generated the capital structure shown in the following table.

Aqua NJ Capital Structure

Capitalization Ratio	2012	2013	2014	2015	2016
Debt	51.8%	44.9%	44.5%	40.7%	43.6%
Equity	48.2%	55.1%	55.5%	59.3%	56.4%
Total Capitalization	100.0%	100.0%	100.0%	100.0%	100.0%

The debt/equity ratio, also referred to as capital structure, is a measure of a company's financial leverage, calculated by dividing long-term debt by stockholder equity. Aqua NJ's capital structure ranged from 51.8% debt and 48.2% equity in 2012 to 43.6% debt and 56.4% equity at the end of 2016. Aqua NJ seeks to maintain a capital structure of approximately 47% debt capitalization to 53% equity, which has been historically recognized as the rate making capital structure in Aqua NJ's most recent base rate case. Aqua NJ periodically files authorization requests for new long-term debt with the New Jersey Board of Public Utilities (NJBPU), as required to achieve the desired capital structure.

Liquidity

A traditional measure of a company's liquidity is its current ratio, also known as the working capital ratio. This ratio is the relationship of a company's current asset balance to its current liabilities balance, expressed as a multiple, with 2:1 considered the ideal minimum. This ratio indicates the number of times current assets are available to pay off current liabilities. Aqua NJ's and Aqua America's Current Asset and Current Liabilities balances and the computed Current Ratio as of the end of the last five years is shown in the following table.

Liquidity ($000)

Balance Sheet Category	2012	2013	2014	2015	2016
Aqua NJ					
Current Assets	−2,298	6,606	7,046	5,600	2,302
Current Liabilities	3,485	4,870	4,011	6,941	8,951
Current Ratio	−.66:1	1.36:1	1.76:1	.81:1	.26:1
Aqua America					
Current Assets	260,894	200,854	152,522	128,370	128,650
Current Liabilities	274,164	279,879	225,335	193,199	301,536
Current Ratio	.95:1	.72:1	.67:1	.66:1	.43:1

Aqua NJ's current ratio ranges from a low of −.66:1 at the end of 2012 to 1.76:1 at the end of 2014. Aqua America's current ratio has trended down from a high of .95:1 at the end of 2012 to a low of .43:1 at the end of 2016.

Water Rates

Aqua NJ utilizes a consolidated rate model as filed most recently in its application to increase water base rates in 2016 (Docket Number WR016010089). The model was prepared utilizing a projected test year (five months actual and seven months projected), through April 30, 2016, adjusted for all known and measurable expense claims, as well as future capital expenditures limited to major projects. The model is based in Excel and is built using data feeds from the Aqua NJ's financial reporting systems including general ledger, property accounting, customer information services, and budgeting software programs. The model includes a Statement of Operating Income, Statement of Rate Base, and Statement of Capitalization necessary to calculate operating income (excess/deficiency) to calculate the necessary rate increase or decrease. This model has been used as the major accounting exhibit in each of Aqua NJ's base rate cases for approximately 20 years.

Aqua NJ has filed for two water rate increases in the past five years as shown in the following table.

Aqua NJ Water Rate Increase Filings (2012–2016)

Docket Number	Date Of Request	Date Of Approval	Percent Amount Requested	Percent Amount Granted	Dollar Amount Requested	Dollar Amount Granted
WR14010019	1/18/2014	8/20/2014	11.16%	3.27%	$3,899,012	$1,150,000
WR16010089	1/25/2016	8/1/2016	6.69%	0.53%	$2,535,564	$200,000

The rate of return (ROR) authorized for the 2014 rate increase was 7.7%, with a return on equity (ROE) of 9.75% authorized. The dollar amount granted ($1,150,000) was 29.49% of the amount requested ($3,899,012). On the 2016 rate increase, the rate of return (ROR) authorized was 7.86%, and the return on equity (ROE) authorized was 9.75%. The dollar amount that was granted in 2016 ($200,000) amounted to 7.89% of

the amount requested ($2,535,564). The major driver for the Aqua NJ rate cases for the past five years has been the recovery of returns on, and of, capital investments which have exceeded annual depreciation for each of these years. Additionally, increases in operating expenses (CAGR of 3.57%) and declining water consumption (CAGR of −0.4%) have also been factors calling for rate increases.

A simple comparison of the current water rates at Aqua NJ with comparable water companies in New Jersey is shown on the following table.

New Jersey Current Water Rate Comparison

General Metered Service	Aqua New Jersey, Inc.	New Jersey-American Water Company	Suez Water Toms River Inc.	Suez Water Toms River Inc. (formerly S.B. Water Company)	Gordon's Corner Water Company	Average Rate
Usage rate per 1,000 gallons	$5.8047	$6.1998	$7.1275	$5.0402	$5.15	$5.8644

Rates shown in the above table are from the NJBPU website and reflect the posted rates for all companies listed under the Tariffs section of the Water Division with the exception of the Middlesex Water Company, for which rates were not posted. Aqua NJ's rate of $5.8047 is the median rate for the companies included in this table and is slightly lower than the average rate for this comparison group.

Dividends

Aqua NJ maintains an equity ratio generally in compliance with all financial covenants of its debt agreements and targeted regulatory capital structure. On an annual basis, the Aqua Services Treasurer and the Aqua NJ Controller create a balance sheet, income statement, and cash flow budget for the upcoming year, taking into account the capital spending requirements and current debt maturities as well as any acquisition or divestitures that will materially impact the capital structure. The Aqua Services Treasurer provides pro-forma capital ratios and makes recommendations on the new financing strategy, the distribution of any dividends to Aqua America, or the need for additional equity contributions from Aqua America. On a quarterly basis, or more frequently as required, the Aqua Services Treasurer calculates the actual financial covenants, including the leverage ratios as defined in each loan agreement. If the equity ratio is greater than the minimum amount required by the covenants and targeted regulatory capital structure, the Treasurer may make a recommendation to declare a dividend to Aqua America. Any request for a dividend distribution must be approved by unanimous consent by the Board of Directors of Aqua NJ. Once the Board has approved a dividend, the Treasurer will take action to pay the dividend.

Dividends paid by Aqua NJ to Aqua America over the past five years are shown in the following table.

Aqua NJ Dividends Paid to Aqua America
($000)

Month Paid	2012	2013	2014	2015	2016	Average
March			500	325	300	
June		1,900		450	250	
September	1,200	175	500	450		
December	200	200	450	425	900	
Total	**1,400**	**2,275**	**1,450**	**1,650**	**1,450**	**1,645**

Dividends paid by Aqua NJ are governed by the needs of its parent, Aqua America, and any restrictions from financial covenants. Dividends paid to Aqua America over the past five years have averaged $1.6 million per year.

Credit Rating

Aqua NJ is not rated by the credit rating companies. Aqua NJ's larger sister company, Aqua Pennsylvania, and its parent, Aqua America, have held an "A+" rating for the past five years from Standard & Poor's (S&P). S&P based its ratings for Aqua Pennsylvania on the very low business risk and steady financial performance of its parent, Aqua America. The stable rating outlook for Aqua Pennsylvania reflected S&P's expectation of sustained solid consolidated financial measures of parent, Aqua America, steady operating performance, and the company's effective management of regulatory risk.

Acquisitions

For all proposed acquisitions of small municipal and non-governmental water systems and wastewater systems, notification of bids must be provided to Aqua NJ's Risk Management and Investment Policy Committee. Aqua America has specific requirements for what types of acquisitions must receive Board approval.

Cash Management

Cash needs for Aqua America average approximately $6 to $7 million per week. Cash received has consistently averaged $9 to $10 million per week. A large bank provides Aqua America's cash management, disbursements (payroll and all payments to vendors), procurement card (p-card) processing, and its main, working capital line of credit, disbursement, and payroll bank accounts. A separate bank provides Aqua America's investment account. Aqua NJ maintains accounts at one bank for cash management small business checking, money market sweep, and petty cash checking and a second bank for the Series K-BB Bond Fund and the NJEDA revenue refunding debt service funds for bonds 2003A and B.

The Aqua NJ bank accounts do not get swept to the Aqua America account. The Aqua America Treasury Department has access to the Aqua NJ bank account only to withdraw dividends. Aqua NJ pays dividends to Aqua America at prescribed times, recently sending in $500,000 in September 2017. Bank account signers at Aqua NJ are the state president and controller. There are no Aqua America authorized signers on the Aqua NJ bank account.

Aqua America uses a treasury tool. Files from banks are entered into the tool from which Aqua America can print reports and manage its cash position. Journal entrees are entered in the tool, and debt information is also warehoused in the tool. This tool is linked to the general ledger system, with IT picking up files or files being uploaded to the general ledger. Through the treasury tool, cash is tracked for Aqua America, Aqua PA, Payroll, and Aqua Resources. The tool also manages debt for Aqua America and Aqua PA and initiates wire and Automated Clearing House (ACH) payments.

Bank accounts for Aqua NJ are monitored by the Aqua NJ accounting department. Aqua NJ debt is also managed by the Aqua NJ accounting department. Wire requests for debt principal and interest payments are submitted to Aqua Services Treasury to issue payment. The main bank's corporate banking system is used as a backup for making wire and ACH payments. The general ledger system is used to prepare purchase orders (PO's) and process invoices. Aqua Services Treasury processes invoices for Aqua America, Aqua PA, Aqua Resources, and Aqua PA Wastewater. Invoices for the states are processed at the state level.

All remittances are processed at a lockbox contractor located on Staten Island, New York. Accounts Receivable in Customer Operations receives a file from the contractor, and funds are transmitted to the main Aqua Services bank on a daily basis. Some checks are received at Aqua Services headquarters for miscellaneous sales, such as company vehicles. These checks are deposited twice a month, using separate deposits for each Aqua subsidiary.

Aqua NJ uses P-cards for miscellaneous operating expenses. These P-cards are processed at the end of the month or billing cycle. Employees code their own transactions and on the 26th – 27th of the month, P-card transactions are downloaded for review and corrections and then run through the general ledger program and posted by the 31st of the month or the 1st of the next month. The main bank uses a web-based spend management system to manage P-card usage. Internal Audit reviews P-card activity and samples some P-card usage once or twice a year. Most employees use P-cards and do not submit expense reports. All executives have company cars. When employees leave Aqua America, HR notifies Purchasing which cancels the P-cards of the ex-employees. Aqua Services Treasury has not seen any problems or had any issues with unauthorized P-card usage.

P-card activity is included on the spend management system from the main bank. Total P-card usage is approximately $1.3 million per month. There is a one percent dividend or refund for P-card usage from the main bank. There is also a dividend or rebate (1.1% to 1.25%, depending on volume) from the main bank for the use of "Ghost Cards." These are transactions without cards that are used to pay some vendors (if the vendor has signed up for the program).

A contracted fleet management service handles fleet management, including leases and gas cards. It provides a monthly statement for each vehicle in the fleet.

Short-term debt

There is no lending between state operations and there is no money pool in which Aqua NJ participates. Aqua NJ currently has no short-term debt outstanding but does have a line of credit available in the amount of $6,500,000.

Long-term debt

Aqua NJ borrows long-term debt using first mortgage bonds, the New Jersey Environmental Infrastructure Trust (NJEIT), and its parent, Aqua America. In New Jersey, Aqua NJ can borrow from NJEIT at a lower rate (0% – 4.66%) than it can receive elsewhere. Funds from NJEIT must be spent on specific, approved projects. Borrowing through the parent, Aqua America, also is more advantageous to Aqua NJ, with rates that are 100 to 125 basis points lower than Aqua NJ would experience on its own. Aqua America's corporate debt is pushed down to subsidiaries based on debt/equity ratio requirements.

A schedule of Aqua NJ's long-term debt as of June 30, 2017 is shown in the following table.

Aqua NJ's Long-Term Debt ($)

Description	Interest Rate	Issue Date	Maturity Date	Original Amount	Balance (Including Current Portion) As Of 6/30/17
Aqua NJ Bonds					
NJEIT - P (Series Q)	0.00%	11/04/04	08/01/24	1,135,000	472,387
NJEIT - V	0.00%	11/06/08	08/01/28	971,000	469,813
NJEIT - X	0.00%	12/02/09	08/01/29	294,000	189,357
NJEIT - W	4.08%	12/02/09	08/01/29	295,000	220,000
NJEIT - K (Series L)	1.50%	01/01/00	11/01/20	3,473,961	790,797
NJEIT- O (Series P)	4.26%	11/04/04	08/01/24	1,300,000	615,000
NJEIT - U	4.10%	11/06/08	08/01/28	985,000	660,000
First Mortgage Bond - Q (Series R)	5.14%	12/23/04	12/23/19	5,000,000	5,000,000
First Mortgage Bond - T	5.80%	12/12/07	12/12/37	3,800,000	3,800,000
First Mortgage Bond - R (Series S)	6.23%	12/15/06	12/15/36	6,000,000	6,000,000
NJEIT – Z	0.00%	03/10/10	08/01/29	235,542	151,709
NJEIT –Y	4.07%	03/01/10	08/01/29	230,000	163,000
NJEIT – AA	4.03%	12/01/10	08/01/30	430,000	345,000
NJEIT – BB	0.00%	10/01/10	08/01/30	212,630	147,759
NJEIT – DD	0.00%	03/28/12	08/01/31	855,017	622,866
NJEIT – CC	4.66%	05/03/12	08/01/31	780,000	675,000
Total Aqua NJ Bonds				25,997,150	20,322,688

Description	Interest Rate	Issue Date	Maturity Date	Original Amount	Balance (Including Current Portion) As Of 6/30/17
Secured Debt – Parent Company					
Push Down Debt – Aqua America	5.40%	05/20/08	05/20/08	1,485,000	1,485,000
Push Down Debt – Aqua America	5.40%	05/20/08	05/20/22	1,485,000	1,485,000
Push Down Debt – Aqua America	5.22%	06/24/10	06/24/28	6,739,590	6,739,590
Push Down Debt – Aqua America	3.57%	06/14/12	06/14/27	11,675,410	11,675,410
Push Down Debt – Aqua America	5.85%	02/28/07	02/28/37	66,615	66,615
Push Down Debt – Aqua America	4.62%	06/24/10	06/24/21	8,480,000	8,480,000
Push Down Debt – Aqua America	4.83%	06/24/10	06/24/24	5,904,470	5,904,470
Push Down Debt – Aqua America	3.59%	05/20/15	05/20/30	7,548,915	7,548,915
Total Push Down Debt				43,385,000	43,385,000
Total Long-Term Debt				**69,382,150**	**63,707,688**

As the schedule shows, Aqua NJ had $20 million in New Jersey Environmental Infrastructure Trust (NJEIT) and first mortgage bonds and over $43 million in push down debt from Aqua America as of June 30, 2017.

Aqua America utilizes the services of Standard & Poor's (S&P) to establish its credit rating. S&P has been encouraging Aqua to expand its current credit facility to $600 million. S&P's current credit rating for Aqua is very good (AA to A+) due to the low volatility of water utilities. S&P visits with Aqua (CEO, CFO, EVP Strategy, and Treasurer) every quarter.

ACCOUNTING

The traditional accounting functions related to the operations of Aqua NJ are performed under the auspices of the Aqua Services CFO. The accounting personnel located at Aqua NJ report directly to the CFO's organization in the Chief Accounting Officer and Controller's (Controller's) unit which reports directly to the CFO and are responsible for most accounting functions.

The Assistant Controller's work group under the Controller is responsible for corporate accounting, customer service accounting and billing, corporate bank reconciliation and reconciliation of billing accounts, intercompany and intracompany account reconciliation, and cost allocations. This group is also responsible for distributing the Flash Reports of all the Aqua subsidiaries, which compares actual revenue, net income

and Operations and Maintenance (O&M) expenses to the budget. Aqua Services Accounting provides each state operation with bills each month for corporate services (includes personnel time) and sundry expenses (everything but personnel time). These services can be for direct charged expenses or for allocated expenses. All bills for the state operations are paid through the Aqua Services Accounts Payable Department.

Accounts Payable

The accounts payable (A/P) data entry process is decentralized at Aqua Services. The accounts payable work group under the Assistant Treasurer provides A/P processing and reporting for the corporate entities and entities located at corporate headquarters, including Aqua America, Aqua PA, Aqua Resources, and all employee expense reports. All A/P functions for Aqua NJ and the other subsidiaries are handled by the A/P personnel located in the subsidiaries.

Each state utility enters its own purchase order, invoices, and check requests into the A/P module. Each state is responsible for security over its A/P process and vendor setup in the corporate accounts payable system. The corporate accounts payable work group enters purchase order, invoices, and check requests for the corporate departments and also handles all employee expense reimbursement for the entire corporation.

All invoices are imaged. When invoices entered in the A/P module are ready for processing, an email is sent to the accounts payable work group that entered the data stating that the “batch is available for release.” This includes a listing of all invoices to be signed by the corporate A/P processor. The A/P module is run in batch mode (managed by the Aqua Services A/P group) after the batches have been approved by the state operations.

The volume of checks written is 1,200 – 1,400 per week. Checks are cut and mailed from Aqua Services headquarters in Bryn Mawr three times per week (Wednesday for Aqua PA invoices, Thursday for all other state operations, and Friday for corporate and Aqua Resources invoices). All checks are controlled and printed on a special check printer by the Accounts Payable Department, across the hall from the mail room. Checks under $25,000 are automatically signed by the check writing application. Checks for greater than $25,000 must be manually signed. There are very few manual checks. Checks from $25,000 to $100,000 require one signature. Checks greater than $100,000 require two signatures. Signers include the CFO, CAO, Treasurer, Controller, General Counsel, and SVP Engineering and Environmental Affairs. Images of invoices are included as supporting backup and reviewed by signers prior to signing checks.

All expense reports are processed identically. Employees have 60 days to turn in their expense reports. Time and expense (T&E) reports come in on a weekly basis with receipts and approvals from all departments and state operations. The top page of the T&E is scanned, but not the receipt documentation. All T&E documentation is filed away in hard copy by batch and company. Occasionally, this documentation is required for an internal audit (usually involving ethics).

ACH is used for employee reimbursement for use of their own cell phones. Wire transfers are used for electronic funds transfers (EFTs) and “Ghost Cards.”

The accounts payable function is audited quarterly by internal and external auditors.

Property Accounting

Property accounting for Aqua NJ is the responsibility of the Aqua NJ Controller. The Aqua Services Property Accounting work group provides support and manages the consolidated property accounting effort. Aqua Services utilizes a software package system for property accounting, including the Budgeting and Asset Investment Planning, Project and Asset Accounting, and Tax Management suites or modules.

The Capital and Project Budget Module provides for the planning and control of all company project expenditures. Budget documentation starts with projects, which can be capital, expense, retirement, or other (e.g., construction done for another party), and estimated at any level of detail. The work order management and project accounting modules ensure that the entire work order life cycle, from budget assignment and project authorization through closing and the unitization of property units, flows logically and consistently. The Unit Catalogue and the Continuing Property Record (CPR) ledger enable the identification of retirement units and the input of work order estimates to facilitate the unitization process. Work order charge processing allows for the on-line review and correction of individual charges as well as the automatic calculation of overheads, indirect charges, tax items, and allowance for funds used during construction (AFUDC) or interest.

The closing process is triggered by the in-service and completion dates. The system can automatically calculate an interest or an AFUDC adjustment to correspond to the in-service date. The Asset Management module contains a fully functional CPR, including a comprehensive on-line unit catalog. Both unitized and non-unitized (unclassified) entries are maintained on the CPR for access and reporting purposes. The CPR contains support for utility and non-utility accounts including leased property and acquisition adjustments.

The corporate Property Accounting work group supports all field operations (all states) with system issues. The field personnel set up their projects in the system and the corporate Property Accounting group assists them, lending direct assistance to the field with capital project or fixed asset issues and reporting. Monthly, this corporate work group closes the work order and CPR ledgers, calculating overheads, AFUDC, work order unitizations and subsequent depreciation, before sending all system created transactions back to the general ledger.

Projects are closed out on Fridays and month-end after as-built data is entered in the system. The unitized file is sent to Aqua NJ property accounting for their agreement, and an Excel file is sent for approval before posting. Aqua NJ does the unitization of assets and maintains the project files.

An aging list of all projects over six months old is prepared. Internal Audit requests this data on a quarterly basis, as do the external auditors. All replacement work orders require that an asset be retired. This is a system requirement. A quarterly Depreciation Certificate is sent to the NJBPU. If Aqua NJ acquires a company, the assets are loaded into the system and Aqua NJ's depreciation reserve balance is updated.

At Aqua NJ, the fixed asset close begins with the open construction work in process (CWIP) report being reviewed by the Aqua NJ Division Engineer. Once the engineer is satisfied with the report, work orders are closed in the system. Blanket work orders must be closed in the system every month. There are approximately 30 blanket work orders. Projects vary in size from approximately $10,000 with some over one million dollars. The average size is $200,000. Fixed assets are usually unitized within one month of project closing.

Financial Reporting

The Aqua Services Corporate Accounting work group, reporting to the Controller, is responsible for consolidations, external financial reporting, technical accounting, and accounting research. This department develops the external financial reports (10-Ks and 10-Qs). Additionally, this group provides assistance to the state controllers in their development of the state operations' financial reports (for those states, including New Jersey, that are required to have audited financial statements because they have their own debt).

Internal financial reporting is the responsibility of the Aqua NJ Controller and the Regional Controller responsible for Aqua NJ. The Flash Report, reporting actual expenses compared to the budget, is prepared by the Aqua NJ Controller preliminarily on the fifth working day of the month and finalized on the sixth working day of the month. The preliminary Flash Report is sent to Aqua Services Corporate Accounting. When the final Flash Report is sent to Aqua Services Corporate Accounting, it includes explanations. There are no set criteria that require explanations for variances. Usually, there are no issues with the Flash Report.

A quarterly report (QtrPak) presents more complete financial and operating data, including key financial and other statistics for Aqua NJ, along with other financial reports. This report presents balance sheet and income statement data compared to prior periods and explanations of variances, cash flow details, changes in asset balances, listing of short-term and long-term debt balances, depreciable property and depreciation calculations, capitalization ratios, gains from sales of land and other assets, customer information including accounts receivable balances, and other operating statistics.

A New Jersey State Opportunities meeting is held later in each month between Aqua America leadership and Aqua NJ leadership to discuss the issues and opportunities for Aqua NJ. These meetings cover:

- Financial results and projections
- Rate Cases
- Capital projects
- Growth
- Compliance
- Customer Service
- Operations

- Legal
- Regulatory Affairs

Tax Accounting

The Aqua Services Tax Department is responsible for filing consolidated federal and state income taxes and tax compliance for Aqua America, Inc. and its subsidiaries, including Aqua NJ. Tax filing is done January through March, with tax compliance work being performed the rest of the year. The Internal Revenue Service (IRS) can audit tax years up through three years after the tax return has been filed. If there is a net operating loss (NOL) for tax purposes, the time that is allowed for audit is up through three years after the NOL has been used. As of 2017 for Aqua America consolidated, tax years through 2011 are closed to federal income tax audit. 2012 and 2013 are closed by statute, but since there was a NOL in 2012 ($280 million), the IRS can audit years at least from 2012 through 2015.

A tax software package has been used for calculating income tax provisions for the past four years and for tax compliance the past two years. Depreciation for income tax purposes is computed in the property accounting system.

Taxable Income and Federal Income Tax for Aqua NJ for the last five years is shown in the following table.

Aqua NJ Income Tax ($000)

Description	2011	2012	2013	2014	2015
Taxable Income	403	6,000	2,665	3,586	11,280
Income Tax	141	2,100	933	1,255	3,948
Effective Income Tax Rate	35%	35%	35%	35%	35%

Aqua NJ's earnings are included with those of Aqua America and its affiliated companies for purposes of filing a consolidated Federal income tax return. The allocation of a portion of the consolidated Federal income tax to Aqua NJ is computed as if Aqua NJ were a stand-alone company filing its own Federal income tax return. The principal advantage of filing a consolidated return is that the losses of one corporation can offset the profit of another—which means less income tax is owed than if separate returns are filed for each member corporation. Other benefits include elimination of intercompany dividends from the corporation's income and, in some cases, the ability to take certain deductions and credits that the corporations may not qualify for on their own. Once a consolidated return is filed, all future returns must be consolidated.

Aqua NJ is party to a Tax Allocation Agreement among Aqua America and its subsidiaries that describe how Federal income tax is allocated to each subsidiary. The intention of this agreement, which has been provided to the NJBPU in Aqua NJ's prior rate cases, is to preserve the economic rights and privileges that would accrue to each entity as if filing their own separate Federal income tax returns.

As a water and sewer corporation, Aqua NJ is exempt from the New Jersey franchise tax (state income tax on corporations). The Aqua NJ Controller is responsible for managing and filing Aqua NJ's state gross receipts tax and property taxes.

Regional Controllers

The Regional Controllers are responsible for consolidating the budgeting and reporting of actual expenses against budgets for the state operations. The Regional Controller, Midwest and Southern Divisions, is responsible for six states – Illinois, Indiana, Ohio, Texas, North Carolina, and Virginia. The Regional Controller, Pennsylvania and New Jersey is responsible for the Pennsylvania and New Jersey operations. The Aqua NJ Controller and the Aqua PA Controller report to the Regional Controller. The Regional Controller is responsible for both state's general accounting, operating budget, capital budget, and rate case processes.

Aqua Infrastructure

Another work group under the Controller is the Controller, Aqua Infrastructure, who is responsible for the accounting for Aqua Infrastructure. Aqua Infrastructure owns a 49% equity interest in a joint venture with Energy Transfer Partners (51%). This joint venture (JV) provides water support to the fracking industry in Pennsylvania and has no employees. An asset impairment was taken in 2015 on the JV's fixed assets. The account department within Energy Transfer Partners performs the accounting for the JV, which is reconciled to the books and records of Aqua Infrastructure by its controller. Although other years have been audited, the financial statements were not audited in 2016 since revenues were so limited ($100,000). The EVP, Strategy and Corporate Development for Aqua America is the President of Aqua Infrastructure and the Management Committee Member representing Aqua Infrastructure's interest in dealing with the JV.

BUDGETING AND PLANNING

Operating Budget

The Planning work group in the Aqua Services Treasury organization manages the budget process and sets budgeting schedules. The Operating and Capital budgets are part of the five-year financial plan. The five-year financial plan, which is refreshed every year, consists of the next-year operating and capital budgets plus four additional years.

The Planning work group utilizes a budgeting software package to generate long term balance sheet and income statement and cash flow financial plans and budgets at the Aqua America level. This work group supports all state budget operations, including Aqua NJ.

The budget process for Aqua NJ starts in June with a kick-off meeting. Budget drivers and estimates are sent to the Aqua NJ Controller. A labor file from Aqua Services Human Resources (HR) is also available to Aqua NJ for personnel costs. A detailed file is provided by the Human Resources Department for all NJ employees. The file includes employee name, current salary, anticipated salary increase, as well as employee benefits, including medical, dental, and 401K. The information provided is

utilized for the purpose of employee budgeting. Open positions are checked to ensure the budget reflects only filled or to-be-filled positions.

The Controller of Aqua NJ coordinates the Aqua NJ operating budgeting process. Multiple meetings are held with each of the three Division Superintendents to build the operating budget. The first meeting identifies special expense projects that are anticipated during the upcoming year. In these meetings, detailed budgets are created for the Outside Maintenance and Operations accounts as well as Purchased Water. The Manager of Operations of Aqua NJ is responsible for estimating production in the strategic plan. The production budget is utilized to budget purchased power. The Manager of Water Quality is responsible for the chemical and the lab testing sections of the budget.

The Controller of Aqua NJ uploads the operating and maintenance expenses into the budgeting system. Reports are generated from the system and reviewed by the Manager of Operations, the Superintendents, the Manager of Water Quality, and the Controller for accuracy.

The Planning work group serves as the system administrators for the budget system and controls security access for all users.

Capital Budget

The capital budget and planning process is centrally coordinated through the Senior VP, Engineering and Environmental Affairs for Aqua Services. Every year, the five-year capital budgets are updated, typically during the months of June and July. The update process begins with a conference call with Aqua NJ in March to review the update process and to provide the milestones and related dates. Aqua NJ Operations and Engineering staff responsible for capital management identify project needs and timing, based on multiple considerations (e.g., facility age and condition, O&M cost reduction, environmental compliance needs, customer service needs, organic growth requirements, franchise obligations), evaluate improvement options and costs, and develop budgetary estimates. Projects are generally categorized as Compliance, Renewal and Reliability, Secondary Water Quality, Expense Reducing/Revenue Producing, Growth-Contractual, or Growth-Natural. As a part of this process, a Capital Budget Planning Worksheet is used to review budget needs and key capital planning metrics. The purpose of the Capital Budget Planning Worksheet is to outline the capital needs of Aqua NJ in a systematic framework consistent with other states.

Adjustments are made to the draft budget update (if needed) and the draft capital budget is entered in the property accounting system so that it can be uploaded to the forecasting and budgeting system for use by state controllers and corporate finance. This typically occurs in two stages, the “first cut” in early June and a “final” in early July. If needed, additional capital planning calls are scheduled with the Aqua NJ President between these dates. The proposed capital budget is reviewed by Aqua America corporate management, including corporate finance, engineering, and compliance personnel. The updated five-year capital and operating budget is incorporated in each state’s business plan and is reviewed with Aqua America’s Board of Directors in the fall of each year. Once approved, the capital budget is implemented by each state company, including Aqua NJ.

Once the capital budget is approved, each project is shown in the budget system with an activity number. A work order authorization must be initiated in the system for each project, following a prescribed management approval chain. Project designs are completed; construction scopes, costs, and schedules are developed; and budget amounts are adjusted, as needed. As work progresses and payments are approved though the accounting system, the payment information is captured in the asset management system and monthly status reports are generated for review and use by management. Upon completion, a project is closed out and charges to that activity number end. Pertinent project cost information is utilized for continuing property records.

Budget Calendar

The financial planning calendar is coordinated by the Planning work group and provided to Aqua NJ, along with an assumption summary file, in June of each year. Throughout the budget and planning process, the assumptions are updated as more detailed information becomes available.

Following is the 2017 schedule for the 2018 operating and capital budget and five-year plan.

2018 Budget and 2018–2022 Five-Year Plan

2017 Schedule	Description of Budgeting Step
Prior to June 16	First draft of capital budget in the property accounting system
June 16	Data for Labor/Benefits File from HR
June 21–23	Labor/Benefits File reviewed – send to controllers
July 10	Capital complete in the property accounting system
Aug 1–15	Labor Files returned to Financial Planning and Analysis (FP&A)
Aug 21–25	FP&A informal review of plans by state
Aug 28–Aug 31	Executive reviews – 2018 Budget
September 8	Finalize budget for CEO review
September 14	CEO review of 2018 Consolidated Budget
September 11–22	Executive reviews – Five Year Plan
September 25	Finalize Plan
October 9	CEO Review of Five-Year Consolidated Plan
November 7	Plan Closed

In August, revenue and expenses are entered at the accounting unit level or cost center level. During the year, the review of monthly results includes the CFO, Treasurer, state president, and state controller. The Executive Review includes the CFO, COO, Engineering and Environmental Affairs, Treasurer, Planning Manager, state president, and state operating personnel. After the budget is prepared, the five-year plan is developed using the budgeting system. This five-year forecast is at the state level, not at the cost center level.

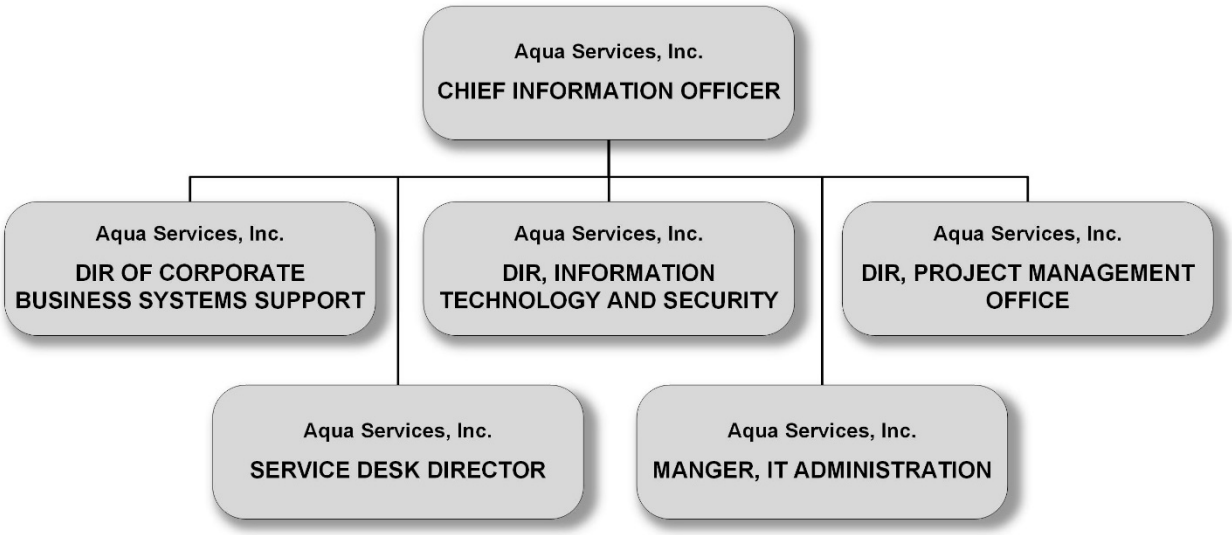
The budgets are presented to the CEO in early November, and budget material is presented to the Board of Directors (BOD). The corporate Planning work group helps develop the budget material, and the Treasurer makes the presentation. Usually, not

many changes to the budget are required by the BOD. The annual budget is loaded into the general ledger and forecasts developed in the budgeting system. Earnings calls comparing actual results to the budget include the Regional Controller, the Controller, Treasurer, corporate Planning, and the state controller.

INFORMATION TECHNOLOGY

The Aqua Services Information Technology (IT) Department is headed by a Chief Information Officer (CIO), who reports to the Chief Administrative Officer. There are five work groups reporting to the CIO as shown in the following organization chart.

Information Technology Department Organization Structure



Information Systems

The Aqua Services IT Department supports all of the major information systems used by Aqua NJ and its affiliates. The major systems supported include:

- Customer information system – this system houses all customer accounts, billing details, service orders initiated by customers, meter reading data, and customer contact information. This system, including source code, was acquired by Aqua America in the late 1990s. There are several hundred system users, including call center representatives and billing, collections, quality control, and meter operations personnel. An upgrade to the underlying technology (servers, databases, and middleware) is planned, starting in 2018. This system has been highly modified for use by Aqua Services. The director responsible for supporting this system believes that it compares favorably with the two major enterprise resource planning (ERP) CIS applications. This system produces one million bills a month within 48 hours of the meter read. Parts of this system are reaching end-of-life status, and Aqua Services is looking at redoing the backend part of the system and the timing of when this could be accomplished. An RFP is in the process of being sent to outside contractors concerning this. The alternative to upgrading the CIS would be to move to another CIS, which would be a very large and very expensive alternative.

- General ledger system – This is a complete financial system that includes general ledger, accounts payable, accounts receivable, and reporting modules. This system was first implemented by Aqua Services 15 years ago and has approximately 600 users. This system was recently upgraded in 2017 from Level 9 to level 10. This project required eight months and cost $1.1 million. The next upgrade would be to Level 11, which is cloud-based and would be in the 2021–2022 time frame.
- Budget system – The budgeting system allows users to enter data into their budgets through a series of web-based input screens or via upload using Excel. The system receives historical data from the general ledger system through a daily, automated process which gives the budget preparer access to historical results for comparison and analysis purposes. Aqua plans to upgrade the budgeting system in 2018 to keep current on vendor support. Aqua Services and Aqua NJ use a small portion of the capabilities of this system. Another budgeting module is used to generate Income Statements, Balance Sheets, and Cash Flow Statements for the five-year planning purposes.
- Property accounting system – This is a capital asset tracking and management system. It is used to track fixed assets, capital projects, and capital budgets. It serves as the fixed assets accounting sub ledger for Aqua NJ's utility plant in service, accumulated depreciation, and construction work in progress (CWIP). It is used to calculate and record depreciation, AFUDC, asset additions and retirements, and overheads. The tax module of this system is also used to record and depreciate tax assets.
- Field service management system – This is a work order management system used by field service representatives for customer-initiated requests and on-going equipment maintenance needs. It was implemented at Aqua Services approximately ten years ago, and there are approximately 750 users.

The six work groups that report to the CIO are:

- Corporate Business System Support
- Infrastructure
- Information Security
- Project Management Office
- Service Desk
- IT Administration

Data Center

The Database Administration systems are standardized on two platforms, Oracle and SQL Server. There are three database administrators (DBAs). The backup data center is tested annually and has not been needed for a real disaster recovery scenario yet. The main data center is moving to a contract facility that houses 40–50 other data centers, including large commercial and hospital systems. The move is supposed to have a neutral cost influence.

The advantages of this move are expected to be increased power and environmental security and redundancy and improved NERC compliance. Additionally, this will free up

space in the current Bryn Mawr building for additional IT staff. The Aqua Services IT staff will run its data center remotely. Housing the full data center in the cloud is not part of their current vision. The data center move is planned to be completed by March 16, 2018.

A discussion of the functions of each of these six groups follows.

Corporate Business Systems Support

This work group is headed by a director with five direct reports and is responsible for all business systems, including the financial information systems and customer information systems (CIS). This work group is responsible for business analysis, programming (internal and outsourced), testing, and quality assurance. Sub work groups are organized by application. Outsourced programming is used when there is complex or unique code.

The Field and Environmental Systems work group is responsible for supporting the field service management system and an asset management system, the systems used on the company's 650 tablets. The tablets are rugged tablets that have a three-year life before they are refreshed.

The CIS Application and Compliance work group is the gatekeeper for the highly modified CIS system. There are several different user groups for the CIS system. This work group provides application support for the CIS system which is run nightly in a batch environment, and tracks requests for changes, enhancements, and small modifications to the CIS system. There is a Change Control Board in Customer Operations that determines if a project is a "go" or "no go" based on cost and benefit analysis. Small modifications are those that cost $25,000 or less. This group does use outside contractors, CIS experts—one who helped develop this CIS system and another contractor who has been involved since the CIS system was introduced to Aqua Services.

The Business Solutions, Corporate Services work group is responsible for Aqua NJ's and Aqua Services' financial information systems: general ledger, budgeting, and property accounting. The financial systems are almost totally vendor-dependent compared to the CIS which is heavily in-house supported. The general ledger system is on the latest version after a recent update. The general ledger is said to be "pretty good," but it seems to take longer to fix bugs than with their more in-house supported CIS system. For example, some bugs identified in December 2016 just got fixed (September 2017). The property accounting system is used for fixed assets. A version update is underway and should be completed in 2018. Customer interfaces have been built for the general ledger and budgeting systems. Document tracking is done by a vendor supported system that integrates with the general ledger program.

Larger projects are managed by the PMO (Project Management Office). There is no vendor file; Aqua relies on institutional knowledge. RFPs are handled by the area that needs the work, with the assistance of Purchasing.

Time keeping, which is now paper time sheets keyed into the current payroll system, will be replaced by a new time keeping system and a cloud-based Human Capital

Management (HCM) system. These systems are scheduled to go live September 2018 for the initial module, with additional features ready in March 2019.

There is some use of contractors for approximately 20% of all systems development and support programming.

The IT department upgrades or replaces systems that are approaching end-of-life status.

Infrastructure

This work group is headed by a Director, with three direct reports. The Director and one of his direct reports are located in Boardman, Ohio, the location of the backup data center.

IT systems run database management systems on a UNIX-type operating system. The Enterprise Systems work group is responsible for all Windows and UNIX-type systems including the general ledger, CIS, property accounting, and budgeting systems. There are 400–450 servers, 85% of which are in Bryn Mawr. A mobile/Windows System Engineer is responsible for supporting all I-phones, tablets and related software, and field systems.

Regional support is provided to all state operations personnel traveling to work sites as required. The support provided includes personal computer fixes; projects to install new equipment; and support involving call center technology, toll-free number applications, and data communications routing.

Information Security

A director with three direct reports oversees Aqua's Information Security practice. An information security work group is responsible for risk mitigation on the Aqua Services network, including maintaining the firewalls, intrusion detection, and use of anti-malware. A vendor performs a quarterly IT security audit and a two-year physical audit. Aqua Services scored better than the industry average on the most recent audit.

Project Management Office

The Project Management Office (PMO) is headed by a director with six direct reports and is responsible for managing all strategic IT projects and core infrastructure projects, such as the accounting system upgrade. At any point in time, there can be 40 IT projects underway, all managed by IT's PMO. There are no size limitations and no minimum size for a project to require a project manager and be run by the PMO. A portfolio management tool is used to keep track of all projects.

When a project has been approved by the IT Steering Committee, the PMO gets involved and starts planning and gathering resources for implementation. There can be functional users involved in the project, but the PMO Project Manager leads the project. The project plan includes the following elements and/or steps:

- RFPs are approved by the CIO.
- Purchasing is involved for everything but the resources (personnel).
- Contracts involve the Legal Department and are signed by the CIO. IT does not require bids for a contract.

- A project begins with a kick-off meeting of all concerned parties. The project manager leads the meetings. The Director, PMO attends when possible.
- Risks are identified and put on a Risk Register.
- Any issues that evolve are put on an Issue List and assigned to a work unit or person to be fixed.
- Project team meetings are held once a week. There are project-related steering committees.
- If there are any changes to the original project plan, a Change Request Form from stakeholders is completed.
- The CIO presents proposed project changes to the IT Steering Committee.

Larger projects are managed by the PMO; the largest current project is the Data Center Relocation.

Service Desk

The Service Desk work group is headed by a director with nine direct report positions. Functions performed by this work group include account administration, help desk, and desktop support.

Account administration includes managing access to the network, including creating access and disabling access to email and other systems on the network such as video conferencing and meeting collaborator.

The Help Desk receives calls and email requests that generate tickets indicating help needed or work to be done with internal systems and hardware and assigns trouble tickets to the proper IT help personnel. Help desk personnel are available to provide support weekdays from 7 AM to 10 PM and weekends from 8 AM to 10 PM. On weekends and evenings after 6pm, help is provided remotely.

Desktop Support provides support in-person, remotely, or by shipping hardware to Aqua employees. There are approximately 2,000 devices that are supported by this group, including desktops, laptops, and tablets (Android). Two different models of desktops are now being supported as well as two different models of laptops.

There is no long-term contract with the incumbent personal computer supplier; IT can change vendors when and if there is a more attractive proposal. Generally, IT keeps hardware models for 12 to 18 months. Suppliers or vendors update the hardware, and there is no obligation to stay with a particular vendor or type of equipment.

The Desktop Support group does a rolling refresh of hardware based on warranties; if hardware is out of warranty, it is subject to be refreshed. Generally, 30 items (desktops and laptops) are refreshed per month. The vendor provides an asset recovery service for hardware being replaced. The Desktop team wipes the hardware that is being replaced. The Director and the Service Desk Supervisor participate in the selection of hardware. Replacement of tablets is managed by the Corporate Business Systems Support work group.

Policies, procedures, and standards for providing Service Desk assistance are available in the Knowledge Base on the company's intranet. There is a checklist of topics, training required, and items to be accomplished for the Desktop team.

IT Administration

This work group is led by a manager with three direct report positions, all of which are in Boardman, Ohio. This work group is responsible for budget and planning, audit testing (Sarbanes-Oxley Act [SOX] liaison with external and internal audit), contract management, and vendor management. A centralized database is used for contract and vendor management. Contracts are negotiated using a standardized template. IT puts out its own RFPs but works with Supply Chain on transactional contracts. Currently, all IT contracts must be approved by the CIO. There are no approval levels and no minimum/maximum thresholds for contracts. The CIO discusses larger contracts with the Chief Administrative Officer and CFO. The largest contract that the CIO has signed to date is $1.8 million for office software support.

INTERNAL AUDIT

Organization

The Internal Audit department resides in the SVP, General Counsel, and Secretary (General Counsel) organization and consists of the Director, four internal auditors, and one seasonal accounting clerk. No contractors are being utilized, but Internal Audit sometimes receives assistance from summer interns and Aqua employees. Summer interns are utilized to augment the audit staff in the summer and, occasionally, the Internal Audit Department uses guest auditors (accountants from state or corporate accounting departments) to also augment their audit staff. Internal Audit staff have external and internal audit experience and fraud examination experience. All staff have been in Internal Audit for at least four years.

The Director of Internal Audit reports to the Audit Committee Chairman with a dotted line to the General Counsel. The Director's bonus is based on meeting goals and objectives, e.g., finishing the audit plan (including the SOX audits), the financial performance of company, and other company comparisons. Goals and objectives are negotiated with the General Counsel and merit pay increases come through the General Counsel.

There are four Internal Audit functions:

- Operations audits – these start in March and run through December. These audits account for approximately 30% of the available Internal Audit Department's hours.
- SOX audit – this is performed as an annual process throughout the year finishing in February and occupies about 22% of the available internal audit hours.
- Direct assistance to external auditors and the pension and 401K plan audits – this assistance is periodic and end-of-year and consumes approximately 15–20% of the available internal audit hours.
- Aqua hotline – this is a year-round activity. There has been an average of three to five calls per year for the last few years. An outside firm receives all calls and

reports them to the CEO, General Counsel, and the Internal Audit Department. The Board Audit Committee hears all fraud-related telephone calls. There have been two calls regarding Aqua NJ operations over the last five years (involving safety and driving). Fraud examinations from the hotline and other reports consume about one to six percent of the available internal audit hours.

Additional functions performed by Internal Audit include auditing officers' expenses and the employee bonus calculations and special projects.

Internal Audit Planning

Internal Audit planning is generally for three years for some areas that are audited, such as the state operations. For other audit areas, a risk ranking order dictates areas to be included in the audit plan. Additionally, the audit plan reflects senior management audit requests. The audit plan is presented at the Audit Committee meeting at the end of the year. Usually, the audit plan is not changed because of this meeting. Although the operational audit plan follows a general three-year plan, only an annual audit plan that is approved by the Audit Committee is prepared. For 2017, the operational audit plan included the following audits:

- Aqua America – Business Continuity
- Aqua America – Acquisitions
- Aqua Charitable Foundation
- Aqua America – Payroll
- Aqua America – Capital Budget Process

Internal Audits

Internal audits are typically staffed with three auditors and last three to four weeks, or 360 to 480 work hours. The audit typically consists of one week of planning, one week on-site gathering information, and one week for report writing and follow-up.

Audits of Aqua NJ have focused on operations and financial management. The Internal Audit Department is planning to include capital spending, inventory, accounts payable, and payments in future audits. Reviews of Aqua NJ operations can also be included in audits of corporate services departments and functions.

The typical internal audit starts with a kick-off or planning meeting with the process owners to discuss the audit team, audit process, and overview of the audit scope. Introductory meetings develop the test plan and further define the audit scope. The audit is conducted, and the audit field work ends with a pre-closing meeting with management in which the high level or preliminary findings are discussed. The report is drafted and discussed among the audit team and the Director of Internal Audit. A meeting is held with the management of the audited area to review the draft report and discuss the observations and action plans and dates for action. Adjustments to the audit report can be made including rewording or correcting observations before the report is finalized and distributed to the CEO, COO, CFO, General Counsel, Corporate Controller, and the Director of Internal Audit. This review may elicit some questions, but usually does not require the audit report to be adjusted. Audit reports are emailed and

presented to the Audit Committee. Action plans to be completed are tracked on a spreadsheet.

SOX Testing

The SOX process is an annual process throughout the year, finishing in February. Testing is primarily done by the internal audit staff. Aqua America's external auditors rely on some of the SOX testing performed by Internal Audit. IT SOX testing is performed by an outside contractor.

Aqua NJ Internal Audits

During the past five years, Aqua NJ has been audited twice by Internal Audit – in 2012 and 2015. Because of the three-year audit schedule for state operations, Aqua NJ is due for another audit in 2018. During this same five-year period, Internal Audit conducted 15 additional operational audits of corporate functions that also serve Aqua NJ.

B. FINDINGS

1. The methodology and basis used to price acquisitions of small, non-governmental water and wastewater systems are reasonable.

A schedule of Aqua NJ's acquisitions over the past five years is shown in the following table.

Aqua NJ Acquisitions
2012–2016

Year	Number of Systems		Purchase Price ($)	Depreciated Original Cost ($)	Percent Purchase Price / Depreciated Original Cost
	Water	Wastewater			
2012	1		162,029	1,968,878	8.2%
2013					
2014	2	1	17,118	86,155	19.9%
2015	1		227,164	307,732	73.8%
2016	2	1	1,683,859	1,892,202	89.0%
Total	**6**	**2**	**2,090,170**	**4,254,967**	**49.1%**
Average			261,271	531,871	49.1%

From 2012 through 2016, Aqua NJ acquired eight water or sewer systems at a cost of approximately $2.1 million. Cost studies performed by an external consultant calculated that the depreciated original cost of the assets acquired was $4.3 million. The calculated depreciated original cost of each of the acquisitions was greater than the purchase price, including closing cost, of the system acquired. Aqua NJ acquired assets whose current value exceeded substantially their depreciated value.

2. Aqua NJ's operating expense ratio has declined over the last five years and does not seem to be affected by the acquisitions of small water and sewer systems.

Aqua NJ's operating expense ratio (the ratio of operations and maintenance expense compared to operating revenues) has declined over the past five years. This is a positive trend for Aqua America because it means that a smaller percentage of operating revenues is required to cover operations and maintenance expense. This ratio, which is more commonly used in the real estate business, is one of the key measures (noted in Aqua America's annual report and 10-K) considered in evaluating its utility business performance within its regulated segment. However, the annual report cautions that, in general, "acquisitions of smaller undercapitalized utility systems in some areas may initially increase our operating expense ratio." However, as the table below shows, this was not the case for Aqua NJ over the past five-year period.

Aqua NJ
Operating Expense Ratio Calculation ($000)

Element	2012	2013	2014	2015	2016
Operations and Maintenance Expense	14,581	14,727	14,345	15,167	15,229
Operating Revenue	37,637	37,382	39,346	42,981	44,352
Operating Expense Ratio	38.7%	39.4%	36.5%	35.3%	34.3%
Systems Acquired	1		3	1	3
Residential Connections Acquired	43		520	94	221

Aqua NJ's operating expense ratio declined overall in the five-year period from 2012 through 2016 and especially in the years in which Aqua NJ acquired the bulk of its small systems (2014–2016).

3. Treasury functions are managed in an effective and cost-efficient manner.

All traditional treasury functions for Aqua NJ, including cash management, short-term debt, and long-term debt are handled by Aqua Services in coordination with the Aqua NJ Controller. The consolidation of these centralized functions allows them to be provided efficiently and with minimal cost and is the standard procedure for treasury functions of utility companies with subsidiary state utility operations. This method of consolidated treasury management produces positive effects for Aqua NJ's profitability, cost of capital, and liquidity, while minimizing financial risk and the necessity for frequent rate increases.

4. Aqua NJ's rate structure and design model is typical to that of similar sized utilities and is constructed to provide accurate and verifiable rates for its ratepayers.

Aqua NJ utilizes a consolidated rate model utilizing a projected test year (most recently five months actual and seven months projected), which is adjusted for known and measurable expense claims, as well as future capital expenditures. The model is built using standard, universal software that allows for ease of review by management and

regulatory bodies and uses data feeds from Aqua NJ's financial reporting systems. The model includes the basic financial statements and calculations necessary to calculate any necessary rate increase or decrease. This model has been used as an exhibit in Aqua NJ's base rate cases for the last 20 years. The major driver for rate increase requests over the past five years has been capital spending.

The following table presents the Aqua NJ capital expenditures, depreciation, the difference between capital expenditures and depreciation, and ratio of capital expenditures to depreciation over the past five years.

Aqua NJ Capital Expenditures Compared to Depreciation ($000)

	2012	2013	2014	2015	2016	Total	Average
Capital Expenditures	8,704	16,268	13,250	21,680	17,530	77,432	15,486
Depreciation Expense	5,491	5,977	6,432	7,037	7,563	32,500	6,500
Difference	3,213	10,291	6,818	14,643	9,977	44,942	8,986
Ratio of Capital Expenditures to Depreciation	1.59	2.72	2.06	3.08	2.32	2.38	2.38

For the past five years, Aqua NJ has spent much more on capital expenditures than its annual depreciation expense. Capital expenditures over the past five years have totaled $77.4 million, an average of $15.5 million per year. Over the same five-year period, depreciation was $32.5 million, an average of $6.5 million per year. Capital spending exceeded depreciation by approximately $9 million per year. The ratio of capital expenditures to depreciation ranged from a low of 1.59 to a high of 3.08, with an average of 2.38. The desire to recover returns on, or of, these capital expenditures appear to have driven requests for rate increases, rather than increases in operating expense.

5. The external audit process is independent and effective in testing and evaluating internal controls based on assessed risk.

The financial statements of Aqua NJ and Aqua America have been audited for the past five years by one of the Big Four certified public accounting (CPA) firms. For each of these years, the CPA firm has performed an audit in accordance with auditing standards generally accepted in the United States of America and has given Aqua NJ and Aqua America a clean opinion, stating that their financial statements presented fairly their financial position as of the end of that year. The external auditors are hired by, and report to, the Audit Committee of the Aqua America Board of Directors. The external auditors meet independently with the Chair of the Audit Committee and the full Audit Committee on a regular basis to discuss any matters concerning the correctness of financial reporting and the effectiveness of internal controls. Additionally, management of Aqua America has stated that, based on the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in Internal Control-

Integrated Framework (2013), internal control over financial reporting was effective for each of the past five years.

6. Accounting procedures comply with Generally Accepted Accounting Principles.

The accounting functions, either performed by Aqua NJ accounting personnel or by Aqua Services or Aqua Pennsylvania personnel for Aqua NJ, are governed by the same accounting policies and procedures. These policies and procedures are similar to those seen at other water, gas, and electric utilities throughout the United States and fully comply with Generally Accepted Accounting Principles (GAAP). The financial reports that have been produced by these accounting functions have been audited by the same external CPA firm for the past five years in accordance with generally accepted auditing standards and have been determined to be in accordance with accounting principles generally accepted in the United States.

7. The budget process operates effectively.

The budget development, revision, reporting, tracking, and analysis functions are performed in an efficient and effective manner. In the budget development stage, directions, timing, assumptions, and analysis and review are handled by the Planning work group in the Treasurer's department. Aqua NJ and the other subsidiaries develop their own budgets from the bottom up, utilizing the direction given to them by the corporate Planning group. Review and analysis of results compared to budget are performed monthly and quarterly with meetings, conference calls, and reports.

8. The CIS is approaching end-of-life status and there are concerns that this system does not adequately support the Aqua NJ business needs.

The basic information systems that support the financial operations of Aqua NJ are maintained and managed by the Aqua Services Information Technology department. The major systems include General Ledger, Accounts Payable, Accounts Receivable, and financial reporting, planning and budgeting, capital asset tracking and management, field service work order management, field asset management work orders, and the customer information system.

The financial systems and the work order systems are mostly vendor-dependent and up-to-date or reasonably current. The CIS is primarily user-supported, with Aqua Services owning 80–90% of the source code. Few problems concerning the financial and work order systems have been brought to the attention of the auditors, while the reviews of the CIS are more mixed. The gatekeeper for the CIS in the Information Technology Department reports that it is comparable to other CIS applications and is efficient and effective, producing approximately one million bills per month with a low percentage of complaints. However, the age of the system (parts of which are reaching end-of-life status), the lack of vendor support, and the user issues reported in the Customer Service chapter of this report are cause for concern. (Also see Chapter IV: Customer Service, for more information on the CIS.)

9. The Information Technology organization structure is designed to provide effective service to Aqua NJ users.

The Aqua Services Information Technology Department is organized in a logical manner to provide necessary information technology services to Aqua NJ. The six work groups that report to the Chief Information Officer have been established to provide necessary information technology functions, including business systems support; infrastructure; information security; project management; service or help desk support; and administrative, contract, and vendor management. All of these functions and work groups, with the exception of one, have been in place for some time and have the requisite knowledge base and experience to provide effective and efficient service to the information technology users, including Aqua NJ.

10. Information Technology does not use vendor performance files in arranging for contractors to work on systems and programming.

Contractors are used for approximately 20% of all systems development and support programming. There are no files on past vendor performance that can be referenced in acquiring knowledgeable, effective, and cost efficient contractors. IT relies on its institutional knowledge in acquiring outside help for its information technology needs.

11. Records management is not centralized for the functions and departments providing support to Aqua NJ.

Records management can be defined as the efficient and systematic control of the creation, receipt, maintenance, use, and disposition of records. Records management for Aqua Services and Aqua NJ is largely resident on the Aqua Services intranet, the private network available only to the employees of Aqua America and its subsidiaries. However, this intranet is not centralized, and each department uses this resource according to its needs and preferences. There is no single schedule or table of contents that list all of the policies and procedures that may be on the Aqua Services intranet. Likewise, there is no single reference on the intranet listing the training materials available. There is no librarian or caretaker who is knowledgeable of all the material (policies, procedures, standards, and training materials) that has been placed on the intranet.

12. Aqua America, Inc. is in compliance with the New York Stock Exchange (NYSE) requirements and the Sarbanes-Oxley Act.

The NYSE rules have a number of requirements, including, independence on the board of directors (BOD), scheduled meetings, types of BOD committees, audit committee charters, codes of conduct and ethics, and management certification of compliance with standards. The Sarbanes-Oxley Act (SOX) includes different requirements, the most notable being requiring the CEO and CFO to certify the periodic financial reports and requiring management to be responsible for an annual assessment of internal controls. These requirements have been certified by management, tested by the Internal Audit Department, and verified by the external auditors.

13. Internal auditing of Aqua NJ's operations has been effective in ensuring compliance with applicable accounting rules and regulations.

The Internal Audit Department has four primary functions – performing operations audits, testing or auditing SOX controls, providing direct assistance to the external auditors in their audit work, and investigating calls received on the hotline. In the first three of these functions, the internal auditors are involved in ensuring that Aqua NJ's operations comply with applicable accounting rules and regulations. In the past five years, the Internal Audit Department has performed 15 operational audits of the Aqua NJ operations or of functions performed by Aqua Services departments that supported the Aqua NJ operations.

In 2012 and 2015, Internal Audit performed audits of Aqua NJ's finance and operations. Areas reviewed in the 2012 audit included capital expenditures and inventory control, rate case preparation, payroll processing, procurement, P-Cards and accounts payable, and accounts receivable. Areas reviewed in the 2015 audit included capital expenditure projects and inventory control, fleet management, payroll processing, procurement and P-cards, accounts payable, and water quality compliance. The conclusion reached after both of these audits was that general processes and controls surrounding finance and operations appeared to be satisfactory. Specific shortcomings were addressed with action plans co-developed by Internal Audit and Aqua NJ management.

In 2017, Internal Audit spent 2,500 hours testing 142 SOX controls that concerned financial functions in support of Aqua America and its subsidiaries, including Aqua NJ. Also in 2017, Internal Audit provided the external auditors with 2,500 hours of assistance in their external audit work.

14. The Internal Audit Department is adequately staffed for the current work load.

The Aqua Services Internal Audit Department is not large, consisting of a director and five auditors. These positions are augmented during the summer by interns and occasionally by personnel from the Accounting Department. No outside contractors are utilized with the exception of external IT auditors needed to leverage their experience and expertise and occasionally, an outside contractor to provide subject matter expertise for an operational audit. This level of audit staff seems to be appropriate for the current work load, allowing Internal Audit to perform the necessary SOX testing, perform the operational audits in their audit plan, and to provide assistance to the external auditors.

15. The Internal Audit Department received a "Partially Conforms" rating on an external quality assessment but is working to correct the deficiencies identified.

In 2015, Internal Audit underwent an External Quality Assessment to determine if this department conformed to the Institute of Internal Auditors' *International Standards for the Professional Practice of Internal Auditing* (Standards). The intent of this assessment was to establish a baseline to measure future progress in adopting all of the Standards and developing a Quality Assessment and Improvement Program and to provide insight into leading practices that could further enhance the efficiency and effectiveness of the internal audit function. This assessment provided a scorecard in 48

different areas under the broader classification of attribute standards, performance standards, and code of ethics, and concluded that this department partially conforms to the Standards and the Code of Ethics.

The Institute of Internal Auditors' (IIA) *Quality Assessment Manual* utilizes a scale of three ratings: "Generally Conforms," "Partially Conforms," and "Does Not Conform." The scores given in 48 different areas under the broader classification of attribute standards, performance standards, and code of ethics were Generally Conforms (42) and Partially Conforms (6). The Partially Conforms scores relate to the attribute standards of the Quality Assurance and Improvement Program, lack of KPIs and internal assessments, and documentation of policies and procedures. On the specific considerations and opportunities for improvement, Internal Audit indicated that it was planning or making progress toward correcting or enhancing its practices to remedy all identified shortcomings.

C. RECOMMENDATIONS

1. Information Technology should evaluate the CIS to determine if it should be replaced. (See Finding 8)

There are differing opinions as to the effectiveness and efficiency of the CIS. However, what cannot be argued is that this system is reaching end-of-life status and is not supported by a software package vendor. Aqua Services owns 80% to 90% of the source code and bears the responsibility of keeping this system as current and effective as possible. Due to the importance of this system, it behooves Aqua Services to seriously evaluate whether to make future modifications and updates or to determine if and when to move to a new system.

2. The Records Management function should be centralized and managed by a records management function. (see Finding 11)

Most, if not all, of the Aqua Services and Aqua NJ departments have their written policies and procedures on the company's intranet. However, the records management function is not centralized and not managed and controlled by records management personnel. In order to ensure that all employees, departments, and functions are being guided by, or have access to, standard policy and procedures, a centralized depository should be maintained. This depository should be controlled and managed by a records management function that makes certain that documentation exists, is current, and is available to the proper users and user groups. The records management function could probably be provided by an individual on a part-time basis.

VII. AFFILIATE RELATIONSHIPS AND TRANSACTIONS

A. BACKGROUND

AFFILIATE RELATIONSHIPS

Aqua America Inc. (Aqua America) is the holding company parent of Aqua New Jersey, Inc. (Aqua NJ). Aqua America owns seven other water utility operating companies in addition to Aqua NJ and two non-regulated companies. These seven regulated water companies and two non-regulated companies are legally defined to be affiliates of Aqua NJ as they have a common parent, Aqua America. However, Aqua NJ has had limited or no reported affiliate transactions with the other regulated utilities and the non-regulated companies and, therefore, does not have material affiliate relationships with them.

Aqua NJ does have affiliate relationships through ongoing transactions with its holding company parent, Aqua America, and Aqua America's principal vehicle for providing common and shared services to its regulated and non-regulated subsidiaries, Aqua Services, Inc. (Aqua Services).

AQUA AMERICA

Aqua America Affiliate Transactions

Aqua America has no employees. All corporate level employees are employees of Aqua Services except for a few Aqua Pennsylvania, Inc. (Aqua Pennsylvania) employees. Aqua America's transactions with Aqua NJ are pass-through or accommodation transactions. These pass-through transactions are performed as a convenience or accommodation to Aqua NJ. These affiliate transactions are merely passing through Aqua America on the way to Aqua NJ. These transactions include: accounting for customer revenue billing and receivables, payroll and payroll-related transactions, inventory transfers, accounts payable, procurement card (P-card) charges, treasury transactions, intercompany journal entries, and equity settlements. The transactions between Aqua America and Aqua NJ in 2016 are shown in the following table.

Transactions between Aqua NJ and Aqua America in 2016 ($000)

Transaction Type	2016	Description
Customer Revenue Billing/Receivables	(43,015)	This represents the amount of customer billing for Aqua NJ for the year.
Payroll	4,263	This includes Aqua NJ employee payroll accruals, deductions, payments, and wages.
Intercompany Equity Settlement	(2,247)	This includes intercompany settlements of balance sheet accounts between Aqua America and Aqua NJ.
Intercompany Journal Entries	6,230	Various journal entries for health and dental benefits, pension, retirement, and life insurance for Aqua NJ employees.
P-card	397	Procurement card expense for charges made by Aqua NJ employees.
Accounts Payable	20,931	Vendor invoice accrual, distribution, and payments.
Treasury	17,282	Cash management transactions including wired funds and electronic fund transfers through Aqua America's banks.

All of these transactions are pass-through transactions and are not subject to allocation methodologies. These transactions are not part of direct charges and allocations from affiliates and are not represented on the monthly Aqua Services bills to Aqua NJ.

Aqua NJ Cash Flow

For the past five years, Aqua NJ has used its own cash to fund its requirements, not relying on inflows of capital or other resources from Aqua America. Cash flow has primarily come from operating activities, issuance of long-term debt, and Aqua NJ's cash balance at the end of 2012. Primary uses of cash have been the purchase of fixed assets, repayment of short and long-term debt, and dividend payments to Aqua America. A schedule of Aqua NJ cash flows is shown in the following table.

Aqua NJ Cash Flow Statement 2012–2016 ($000)

Description of Cash Flow	2012	2013	2014	2015	2016
Net Cash Flows for Operating Activities	20,691	16,548	14,129	22,519	24,672
Purchase of Fixed Assets	(9,677)	(14,575)	(12,020)	(19,622)	(15,057)
Acquisition of Water/Wastewater Systems			1		
Increase in Funds Restricted for Construction	(2,138)				
Decrease in Funds Restricted for Construction	1,610	515		47	
Other				(22)	
Net Cash Flows From Investing Activities	(10,205)	(14,060)	(12,019)	(19,597)	(15,057)
CAC and CIAC[1]	630	50	334	252	432
Repayment of Customers' Advances	(692)	(619)	(533)	(1,016)	(655)
Repayments of Short-Term Debt	(2,960)				
Proceeds from Long-Term Debt	1,545		7,000	(509)	(7)
Repayments of Long-Term Debt	(6,493)	(531)	(7,554)		(7,996)
Dividends Paid on Common Stock	(1,400)	(2,275)	(1,450)	(1,650)	(1,450)
Net Cash Flows From Financing Activities	(9,370)	(3,375)	(2,203)	(2,923)	(9,676)
Total Net Cash Flow	1,116	(887)	(93)	(1)	(61)
Cash at Beginning of Period	163	1,279	392	299	298
Cash at End of Period	1,279	392	299	298	237

[1] CAC = customer advances for construction; CIAC = contributions in aid of construction

As a result of Aqua NJ's use of funds to purchase fixed assets, repay debt, and make its annual dividend payments, its year-end cash balance decreased over 80%, from approximately $1.3 million at the end of 2012 to just over $.2 million at the end of 2016.

AQUA SERVICES

Aqua Services was formed in 2004 and consists of approximately 200 employees who manage the operations of Aqua America and provide support for the operations of Aqua NJ, as well as those of Aqua America's other water and wastewater utilities and non-regulated subsidiaries. Aqua Services is a non-regulated Aqua America subsidiary incorporated in Pennsylvania and operating primarily at the Aqua America headquarters in Bryn Mawr, Pennsylvania.

Services provided to Aqua NJ by Aqua Services include:

- Executive Management
- Accounting and Financial
- Administration
- Customer Services
- Communications
- Corporate Secretarial
- Engineering
- Human Resources
- Information Services
- Legal

- Purchasing
- Rates and Regulatory
- Water Quality

Aqua Services Affiliate Transactions

Aqua Services includes the Aqua Customer Operations (ACO) department. However, ACO charges to Aqua NJ are handled slightly differently than the other Aqua Services departments and the ACO charges to Aqua NJ are covered in a separate section below.

The following table presents the transactions between Aqua NJ and Aqua Services (with the exception of transactions with ACO) over the past five years.

Transactions between Aqua Services and Aqua NJ 2012–2016 ($000)

Transaction Type	2012	2013	2014	2015	2016	CAGR[1] 2012–2016
Intercompany Equity Entries	(2,202)	(2,457)	(2,811)	(2,747)	(3,358)	11.1%
Management Fees (Services and Sundry)	1,677	1,723	1,910	2,113	2,398	9.4%
Management Fees (Accounts Payable Direct)	679	757	803	732	955	8.9%
Prior Year Adjustments	14					N/A
[1] CAGR = Compound Annual Growth Rate						

Intercompany Equity Entries include balance sheet adjustments and intercompany equity settlements. Management Fees (Services and Sundry) includes Services expenses, which are labor and overhead related, and Sundry, which is all other non-labor expenses. Management Fees (Accounts Payable Direct) are payments through Aqua Services Accounts Payable for costs incurred directly by Aqua NJ. For affiliate relationship purposes, the important category of transactions is the Management Fees (Services and Sundry) which are the charges to Aqua NJ for the executive management and administrative services provided to Aqua NJ by Aqua Services. Over the past five years, Management Fees (Services and Sundry) have increased at a compound annual growth rate of 9.4% from $1.7 million in 2012 to $2.4 million in 2016.

Affiliate Agreement

The most recent Service Company Agreement between Aqua NJ and Aqua Services is dated January 1, 2014. This agreement stipulated that Aqua Services would provide corporate management services and other services that both parties agreed upon for Aqua NJ. Aqua NJ is not prevented from performing any of these services with its own personnel or engaging another company or person to provide those services on its behalf. Aqua Services may engage or subcontract with another company or person to provide such services on its behalf.

If Aqua Services engages other affiliates of Aqua America to provide any of the services agreed upon, such services shall be charged to Aqua NJ on the same basis as the services provided by Aqua Services. Aqua Services agreed not to enter into

agreements to perform similar services for other affiliated companies on terms more favorable than the terms provided to Aqua NJ and to maintain information from Aqua NJ as confidential and not disclose such information to third parties.

Cost Accounting and Allocation

Costs related to services provided to Aqua NJ from all sources are collected, direct charged, or allocated to Aqua NJ as described and governed by the Aqua America Corporate Charges Allocations Manual. The Corporate Charges Allocation Manual serves as the cost allocation manual (CAM) for Aqua America. This manual describes the types of services that Aqua Services will provide to Aqua NJ and the other affiliates. It gives instructions on direct charging time to entities that receive service, indirect charging or allocating time to various combinations or groups of entities, and the allocation process to be used. Descriptions and examples are given of calculating billable hours, determining billable dollars, and the manner in which these costs, along with overhead and non-labor costs, are to be allocated to the affiliate or affiliates being served.

Cost Classifications

For affiliate billing purposes, Aqua Services' expenses are classified as either Service or Sundry expenses. Service expense is the labor and overhead cost of employees of Aqua Services. Labor is defined as the actual base pay of employees of Aqua Services. Overhead costs include healthcare, employer payroll taxes, retirement benefits, office rent, and employee incentive compensation. Sundry expenses are all expenses that are not labor or overhead.

Accounting Units

Service expenses are accumulated in cost pools named Accounting Units that have been established in the general ledger. Service expense Accounting Units that have a four-digit code represent an established accounting method for collecting labor and overhead costs for allocation to the regulated and non-regulated affiliate entities from the Service Company. Sundry expense Accounting Units that have a three-digit code represent non-labor costs for an organizational work group or groups (department or location). Service Accounting units represent allocation methodology selected by employees on their timesheet. Sundry accounting units represent department or location (cost centers) but allocation is determined by the activity code attached to each expenditure.

Accounting Unit Cost Allocation Recipients

Once costs have been accumulated in the Service Accounting Units, they are allocated among the affiliated entities according to fixed allocation recipients. Each Accounting Unit represents a different group of cost allocation recipient entities. For example, there are specific Service Accounting Units for allocations to:

- All affiliate entities
- Aqua NJ
- Aqua Pennsylvania
- All regulated affiliate entities

- Affiliate entities utilizing ACO
- The unregulated entities

An example of an Accounting Unit allocation methodology is, "Charge 70% to Aqua Pennsylvania, 10% to Aqua Resources and allocate the remaining 20% to all affiliate entities." Fifteen of the 31 Service Accounting Units had some amount of allocations to Aqua NJ in 2016.

Cost Allocation

The costs in each Accounting Unit are allocated to the designated recipients based on the previous year-end customer count for each entity. Most of the Accounting Unit cost allocations are based on the total customer count for each entity included in the allocation group. In each entity, water service customers are counted as one customer and wastewater service customers are also counted as one customer. Customers that have both water and wastewater services at a single address are counted as 1.5 customers. For example, an entity with 100 water customers and 100 wastewater customers utilizing separate service addresses would count as 200 customers for cost allocation purposes. An entity with 100 customers having both water and wastewater services at the same address would count as 150 (100 times 1.5) customers for cost allocation purposes. Aqua NJ's share of an Accounting Unit's costs are its total calculated customers divided by the total calculated customers of all the designated recipients of that Accounting Unit.

Some of the Accounting Units have variations on the total customer count cost allocation. For example, the Accounting Unit that is just allocated to entities with wastewater customers uses only the wastewater customer count.

The Aqua NJ customer count allocation calculation compared to the total Aqua America affiliated entities allocation calculation for 2012 through 2016 is shown in the following exhibit.

Aqua NJ and All Affiliated Entity Customer Counts 2012–2016

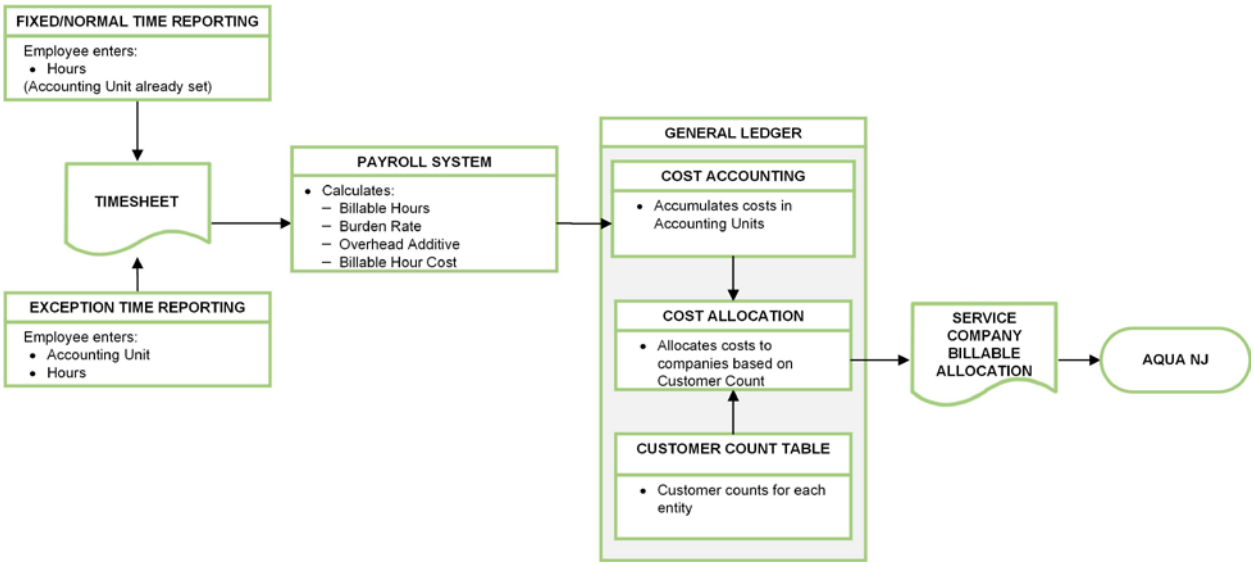
Customer Count	2012	2013	2014	2015	2016
Aqua NJ	54,995	55,328	55,686	56,332	56,675
Total of All Affiliated Entities	916,839	901,254	903,615	912,805	921,904
Aqua NJ Percentage	5.9983%	6.1390%	6.1626%	6.1713%	6.1476%

The total customer allocation to Aqua NJ has increased from 6.00% in 2012 to 6.15% in 2016, meaning Aqua NJ is receiving a larger share of Service Company expenses allocated on total customer counts.

Service Expense Accounting and Allocation

A flowchart depicting the flow of the process steps to account for and allocate Service (labor) expense to Aqua NJ is shown in the following exhibit.

Process Flow for Service Expense Accounting and Allocations



Fixed Time Reporting. In normal time reporting mode, most employees just enter their time worked and/or paid time off (vacations, personal, and sick time) hours on their timesheets. The hours are then allocated to Accounting Units according to fixed time allocations.

Instructions on time reporting are given to each employee who is hired by Aqua Services. The "Aqua Services, Inc. Timesheet Instructions" documents the transaction policies, procedures, and practices used in completing timesheets. These instructions direct the newly hired employee on the importance of reporting their time and that their labor and related overheads will be allocated to a subsidiary or group of subsidiaries of Aqua America based on the services that the employee is providing.

Exception Time Reporting. Employees are given a default allocation Accounting Unit to record their time but have the ability to change the accounting unit through a drop-down menu on the timesheet. Aqua Services' employees can report exceptions to the fixed time allocations. For exception time reporting, employees select Accounting Units to associate with their work hours from available menus on their timesheets. This is how time charges to individual capital projects or special projects for a specific affiliated entity, including Aqua NJ, can be collected.

Payroll System Processing. Each labor hour is charged to an Accounting Unit based on a labor rate calculated by dividing the total salary and wage cost plus overhead charges by the billable hours to get a billable hour labor rate.

Billable hours are calculated by reducing an employee's annual work hours by the amount of paid time off during the year. If an employee worked a 40-hour work week for 52 weeks in the year, the total annual work hours would be 2,080 hours (40 hours per week X 52 weeks = 2,080 hours). If this same employee had 196 hours of paid time off during the year for vacation, holidays, sick time, and personal time, then this employee's billable hours would be 1,884 (2,080 hours less 196 hours of paid time off = 1,884 billable hours).

The billable hours for each employee of Aqua Services are estimated at the beginning of each year based on anticipated paid time off (vacation, holidays, sick-time and personal days). By year's end, the employee will have billed out actual time worked. Adjustments are then made for paid time off at the end of each year in order to reconcile the difference by employee for actual paid time off versus estimated paid time off. All billable hours are recorded on an employee's timesheet.

Overhead expenses are additional employee compensation and included in the employees' billable hour calculation. As a part of the annual budget process, these costs are identified by employee. After the budget has been finalized, the overhead costs are calculated by type of cost and loaded into payroll as a payroll additive to the employee's hourly rate. This payroll additive is calculated into the hourly rate based on the budget or best available information.

The relationship between annual work hours (2,080) and billable hours (1,884 in our example) yields a labor burden rate of 1.104034 (2,080 hours divided by 1,884 hours = 1.104034). This burden rate is multiplied by the employee's overhead expense additives and the total cost of these additives are added to the hourly pay rate to yield a billable cost in an hourly rate for each employee.

Each employee's payroll timesheet is reviewed and approved by a supervisor prior to being processed through the payroll center with hours recorded into the payroll subsidiary database. This database contains tables to calculate and process Service billings to the appropriate Accounting Unit.

Cost Accounting. The four-digit Accounting Units collect labor and overhead costs that will be allocated to a specific affiliate or affiliate group(s)

Cost Allocation. After the labor and overhead costs have been assigned to Accounting Units, costs are allocated among the designated recipients of that Accounting Unit based on calculated customer counts.

Service Company Billable Allocation. Services provided by Aqua Services are billed to Aqua NJ every month. The bill provides details down to the individual employee who is charging time to Aqua NJ. Monthly bills include the following data for each Service charge to Aqua NJ:

- Activity – service being performed
- Employee name
- Total hours charged by this employee this month to Aqua NJ
- Total amount of charge by this employee to Aqua NJ

Sundry Expense Accounting and Allocation

Sundry charges include all other non-labor costs which are not included in the Service allocations such as, supplies, shipping, travel, and telecommunications. The Sundry expenses are charged to a three-digit accounting unit which represents a department or location. Each Sundry expense is charged to an activity code selected by the preparer and/or approver of the expense. The allocation of the sundry expenses is allocated among the affiliated entities based on the activity code.

The Accounts Payable Department under the Assistant Treasurer provides accounts payable and employee expense report processing and reporting. The Accounts Payable Department enters into the Accounts payable system the Accounting Unit(s) and activity code(s) on each invoice and expense report. Sundry costs post to the general ledger under three-digit Accounting Unit numbers and are allocated to the designated recipients by customer count for the activity code selected.

AQUA CUSTOMER OPERATIONS

Aqua Customer Operations (ACO) is a department of Aqua Services and is responsible for all customer service center and back-office interactions with Aqua NJ and the other Aqua America utilities customers. This includes billing and collection for services provided, as well as managing customer service centers that directly interface with customers regarding setting up new accounts, closing accounts, and problems with accounts and service. Customer field services are provided by Aqua NJ. As a part of Aqua Services, ACO expenses are allocated to Aqua NJ and all the other affiliates utilizing a similar customer count allocation methodology as Aqua Services.

ACO Transactions with Aqua NJ

Transactions between ACO and Aqua NJ over the past five years are shown in the following table.

Transactions between ACO and Aqua NJ 2012–2016 ($)

Transaction Type	2012	2013	2014	2015	2016	CAGR 2012–2016
Intercompany Equity Entries	(768,629)	(763,442)	(725,892)	(809,966)	(824,079)	1.8%
Customer Account/Billing Service	669,530	661,996	618,206	684,936	696,399	1.0%
ACO Direct (Call center, collections, and other contractors)	97,571	107,480	110,571	124,533	124,896	6.4%

Intercompany Equity Entries include balance sheet adjustments and intercompany equity settlements. Customer Account/Billing Service are the internal employee labor and overhead costs along with non-labor departmental costs of ACO. Amounts on this line also include state coordinator labor and overhead costs directly charged to Aqua NJ. ACO Direct costs are the costs of the several ACO contractors. Customer Account/Billing Service transactions increased by only one percent compound annual growth rate over the five years while ACO Direct transactions increased at a compound annual growth rate of 6.4%, indicating a greater reliance on contractors and less on employees.

ACO Cost Accounting and Allocations

Aqua America affiliate entities may enter into billing and contract operations with non-affiliated entities that may utilize ACO's services and/or the customer information system (CIS). The non-affiliated entity portion of total ACO costs is calculated first based on the percentage of non-affiliated budgeted revenue as a percentage of the total

revenue generated from the CIS for the current year. The remaining portion of the billable cost is allocated to the affiliated utility companies utilizing the ACO services and systems based on the customer count methodology similar to Aqua Services.

In general, ACO employees do not track their time by affiliate or non-affiliate client. There may be instances that an employee may charge directly to an affiliate, a group of affiliates, or a non-affiliated client for a service specific only to that entity, but, in general, ACO employees do not track their time by affiliate or non-affiliated client.

B. FINDINGS

1. Aqua Services and ACO expenses charged to Aqua NJ have been increasing at a faster rate than other Aqua NJ expenses.

Aqua Services Management Fees and ACO charges to Aqua NJ compared to Aqua NJ's Utility Cost and Expense amount for the past five years are shown on the following table.

Aqua Services and ACO Charges and Aqua NJ's Utility Cost and Expense 2012–2016 ($000)

Transaction Type	2012	2013	2014	2015	2016	CAGR 2012–2016
Aqua Services Management Fees[1] to Aqua NJ	1,677	1,723	1,910	2,113	2,398	9.4%
ACO Total Charges, Labor and Contracts	767	769	729	809	821	1.7%
Total Aqua Services and ACO Charges	2,444	2,492	2,639	2,922	3,219	7.1%
Aqua NJ's Utility Cost and Expense	25,566	26,997	26,833	28,516	29,415	3.6%
Aqua Services and ACO Charges as a Percent of Utility Cost and Expense	9.6%	9.2%	9.8%	10.2%	10.9%	
[1] Includes Services and Sundry						

The total of Aqua Services and ACO charges to Aqua NJ increased at a compound annual growth rate of 7.1% over the five-year period while the Aqua NJ Total Utility Cost and Expense increased at a 3.6%. The total Aqua Services and ACO charges to Aqua NJ as a portion of the Utility Cost and Expense increased from 9.6% in 2012 to 10.9% in 2016.

2. Policies and procedures adequately document the Aqua NJ affiliate transaction process with Aqua Services.

Policies and procedures concerning affiliate transactions between Aqua Services and Aqua NJ are contained in several documents: Service Company Agreement, Corporate Charges Allocation Manual, and Aqua Services, Inc. Timesheet Instructions. Collectively, these documents provide adequate documentation of the Aqua NJ affiliate relationship with Aqua Services with the exception of the Accounting Units.

3. There could be better transparency concerning the departments or type of costs that are collected in and allocated from the Accounting Units.

The Service Accounting unit's description denotes the methodology for the allocation. When the employee completes their timesheet, in addition to selecting the accounting unit, they also select an activity code. The activity code represents the type of work being performed. The Service bill received by the affiliate state details by activity each employee performing that activity, the hours the employee performed that activity, and the total amount billed for that activity. The affiliate state also receives a separate report that summarizes the total amounts billed by each Accounting unit (allocation methodology).

Sundry Accounting unit's description list the department or location. When the preparer completes a payment document for each sundry expense, in addition to selecting an accounting unit, the preparer also selects an activity code.

For Sundry expenses, the allocation is not based on the accounting unit, but rather is based on the activity assigned to each expenditure by the preparer of the payment documentation. The activity has a description of the allocation methodology similar to the Service Accounting unit. The Sundry billing details each non-labor expenditure incurred during the month. The bill details the vendor name, the invoice number, the activity code, the total amount of the invoice, the accounting unit, the originating GL account on the Service Company, and the amount billed to affiliate state.

The rationale for the allocation entities assigned to Accounting Units could be more transparent. There were 31 Accounting Units in 2016 for Service costs, each with its own allocation entities. Further, each Accounting Unit had an associated customer count allocation basis that dictated the allocation percentages to distribute costs to the receiving entities. Fifteen of these Accounting Units had allocation percentages for distributing costs to Aqua NJ. Examples of Accounting Units that applied to Aqua NJ in 2016 included Accounting Unit 1111 – "Allocate 100% to all affiliate entities" and Accounting Unit 1180 – "Charge 70% to Aqua Pennsylvania, 10% to Aqua Resources and allocate the remaining 20% to all affiliate entities." However, there was no identification of the departments charging the Accounting Units or a description of the type of services for which costs were accumulated in each Accounting Unit.

4. Allocation percentages to entities attached to the Accounting Units appear to be arbitrary.

There is no explanation of the rationale behind the percentages used to allocate the costs out of the Accounting Units among Aqua NJ and the other entities. Nine of the fifteen Accounting Units applicable to Aqua NJ use a methodology that is based on different percentages of "all affiliate entities" to allocate costs (e.g., 15%, 20%, 30%, 49.5%, 50%, 60%, 70%, 90%, and 100%). The percentages used seem to indicate that these are rough estimates of the amount of cost that should be allocated and not based on any measured statistics.

5. Too much of Aqua Services' costs charged to Aqua NJ are allocated, rather than direct charged.

Direct and indirect charges to Aqua NJ over the past five years are shown in the following table.

Direct and Indirect Charges to Aqua NJ 2012–2016 ($000)

Type of Charge	2012	2013	2014	2015	2016	Total	Percentage of Total Charges
Direct	72	46	159	207	168	652	6.7%
Indirect	1,561	1,646	1,757	1,895	2,188	9,047	93.3%
Total	**1,633**	**1,692**	**1,916**	**2,102**	**2,356**	**9,698**	**100.0%**

Over the past five years (2012–2016), $.7 million in direct charges from Aqua Services were billed to Aqua NJ. This amounted to approximately seven percent of the total $9.7 million in charges billed to Aqua NJ during this period. The remaining $9.0 million of charges were allocated to Aqua NJ based on the number of customers associated with each Accounting Unit.

6. There is limited affiliate relationships and transactions training.

Affiliate relationships and transaction training is limited to instruction on how to complete an employee timesheet. This training documentation consists of the "Aqua Services, Inc. Timesheet Instructions," a one-page document given to new employees when joining Aqua Services. There is no background or history discussing affiliates, federal and state regulatory requirements, potential problems and issues that could arise, or the importance of accuracy and correct assignment of time and expenses to the proper cost centers.

7. The basis for allocating Aqua Services executive compensation to Aqua NJ is the same as other costs allocated to Aqua NJ.

Executive compensation for the Aqua Services officers is allocated to Aqua NJ in the same manner as all other Services costs from Aqua Services. In 2016, executive labor costs were assigned to one of the fifteen Accounting Units that distribute costs to Aqua NJ. From the groups of affiliate entities, cost is allocated based on customer count.

Executive compensation is assigned to Aqua NJ as an indirect charge. The amount of executive compensation allocated to Aqua NJ compared to the total amount of charges (direct and indirect) to Aqua NJ over the last five years is shown in the following table.

Executive Compensation Allocations 2012–2016 ($000)

Type of Charge	2012	2013	2014	2015	2016	Total
Executive Compensation Allocation to Aqua NJ	318	304	349	324	371	1,666
Total Charges to Aqua NJ	2,444	2,492	2,639	2,922	3,219	13,716
Executive Compensation As Percent of Total Charges to Aqua NJ	13.0%	12.2%	13.2%	11.1%	11.5%	12.1%

The amount of executive compensation allocated to Aqua NJ increased from $318 thousand in 2012 to $371 thousand in 2016, an increase of over 16%. During the same period, the total charges to Aqua NJ increased by over 31%, from $2.4 million to $3.2 million. Therefore, the percentage of total charges to Aqua NJ attributed to executive compensation decreased from 13.0% to 11.5%, averaging 12.1%.

8. Controls over Aqua NJ's affiliate transactions are reasonable.

Aqua America and its subsidiaries have internal controls related to costs that are incurred by a subsidiary. These controls include the normal purchase order process, check request process, wire request process, payroll process, and P-card process. These costs require approvals by the appropriate management personnel based on the total amount of the cost and the type of cost. Costs for Aqua Services are compared to budget and allocated to affiliates based on an annual documented methodology.

For charges assigned or allocated to Aqua NJ, a control sheet is used by Aqua Services Corporate Accounting to ensure that all Services charges relating to the four-digit Accounting Units within Aqua Services are equal to all charges allocated to Aqua NJ's clearing accounts. Reports provide backup support for the charges which are allocated to Aqua NJ. These reports tie into the amounts charged to the clearing account at the Aqua NJ level. Reports contain total costs by employee, by type of service, and for the number of hours charged. Allocations are updated annually by Aqua Services Corporate Accounting.

In addition to the reconciliation of the charges allocated to Aqua NJ, actual expenses are trued-up by type. As expenses from budget change or employees use more or less paid time off than budgeted, adjustments are generated. Unless significant changes to expense from budget occur, adjustments to expense are done on a yearly basis. All adjustments to expense are recorded through payroll. Reports are generated based on expenses that are posted through the payroll system. In order for a report to tie to the allocations, all service related expenses are posted through payroll.

Annually, as part of the Sarbanes Oxley Act (SOX) controls, the Controller, Aqua Services, reviews and approves the overhead and payroll allocation percentages used to allocate costs to Aqua NJ.

In 2016, Aqua Services' Internal Audit Department conducted an audit of affiliated interest agreements between Aqua Services and Aqua NJ and the other subsidiaries of Aqua America. This audit assessed the adequacy of internal controls and quality of ongoing operations related to affiliated interest agreements and cost allocations

including, but not limited to: computation of allocation factors, reconciliations of monthly allocation charges, review and approval of allocation entries, and adherence to terms of the various affiliated interest agreements. The conclusion from this audit was that the general processes and controls surrounding affiliate interest and cost allocations and the adherence to the terms of the affiliated interest agreements appeared to be satisfactory. This indicated an acceptable system of internal control and satisfactory compliance with applicable policies and procedures, with an observation that Aqua Services monthly invoices did not include the allocation percentage that determined the basis of the charges to the states. This finding has since been corrected by Aqua Services.

9. Aqua NJ's effective Federal income tax rate is much higher than Aqua America's effective Federal Income Tax rate.

The effective federal income tax rates for Aqua NJ and Aqua America for the past five years are shown in the following table.

Effective Federal Income Tax Rate 2012–2016

Company	2012	2013	2014	2015	2016
Aqua NJ	34.4%	34.4%	36.1%	34.3%	35.1%
Aqua America	26.4%	9.5%	10.5%	6.9%	8.2%

For the past five years, Aqua NJ's effective Federal income tax rate has exceeded 34.0%, while the effective income tax rate of its parent has ranged from a low of 6.9% to a high of 26.4%. Aqua NJ is party to a Tax Allocation Agreement among Aqua America and its subsidiaries that describes how the corporate Federal income tax is apportioned to each subsidiary. The intention of this agreement is to treat each subsidiary as if the subsidiary were filing its own separate Federal income tax return.

Aqua NJ's taxable income as a percentage of the total taxable income for all the Aqua America companies is used to allocate the consolidated Federal tax liability to Aqua NJ. All consolidated eliminations or adjustments are allocated to the company which is entitled to the income or deduction. Any tax savings are allocated to affiliated companies, including Aqua NJ, based on the percentage of net operating losses attributed to Aqua NJ or the other affiliates. For the past five years (2012–2016), Aqua NJ has recorded positive net income and an attributed Federal income tax liability.

10. The Aqua Resources service line warrantee product provided by HomeServe, an unaffiliated company, and sold to Aqua NJ customers is not reported as an affiliate relationship and transaction.

Aqua Resources, an unregulated affiliate of Aqua NJ, sells service line warrantees to Aqua NJ ratepayers. The warrantee program is offered by HomeServe, an unaffiliated company. HomeServe offers exterior water service line coverage to customers of Aqua NJ. These transactions are not listed as affiliate transactions between Aqua Resources and Aqua NJ, or as transactions between HomeServe and Aqua NJ. The only affiliate transactions between Aqua Resources and Aqua NJ in the past five years are minor

amounts listed as intercompany equity settlements and a reclassification of an incorrect charge to Aqua NJ.

11. A review of Board of director meeting minutes did not reveal any discussions considered harmful to Aqua NJ's ratepayers.

A review of Aqua America's Board of Directors' meetings and committee meetings in 2017 did not reveal any issues or discussions that would adversely affect Aqua NJ ratepayers. Minutes reviewed included meetings of the Board of Directors, Audit Committee, Corporate Governance Committee, Executive Compensation Committee, and the Risk Mitigation and Investment Policy Committee.

C. RECOMMENDATIONS

1. Improve the transparency of the Accounting Units and the applicable departments, functions, and cost centers by name, and document the allocation methodologies in the Corporate Charges Allocations Manual. (See Finding 3)

In the current Corporate Charges Allocations Manual there is no identification of personnel or departments or type of services which should be charged to an Accounting Unit. Since most employees' time is fixed and charged to the same Accounting Units, the designation of Accounting Unit(s) for each department and employee should be included in the allocations manual. This will enable management to more easily determine that correct entries have been made and allow auditors to verify that departments and personnel are correctly following policies and procedures.

2. Reevaluate current allocation methodologies. (See Finding 4)

The current allocation methodologies establish what percentages of costs accumulating in Accounting Units are distributed and to which entities. The current percentages are round numbers, i.e. 100%, 70%, and 20%, indicating that they are most likely based on rough estimates and are arbitrary. Time studies should be conducted, or other empirical data should be gathered, upon which to base the allocation percentages.

3. More affiliate cost from Aqua Services assigned to Aqua NJ should be directly charged rather than allocated. (See Finding 5)

Over the past five years (2012–2016), only seven percent of the total charges from Aqua Services' to Aqua NJ were direct charged. This is considerably less than is usual for affiliate charges between utility service companies and utility operating companies. Approximately 93% of charges were allocated. This is a high percentage of costs to be allocated, rather than direct charged. The percentage of charges that are direct, rather than allocated, in most utilities is in the 30% to 40% range, with 60% to 70% being allocated. Transactions with service departments that usually lend themselves to quantification, measurement, and direct charging include services provided by legal, information technology, human resources, and treasury departments. Aqua Services and Aqua NJ should examine all the services provided to Aqua NJ to determine which services would lend themselves to direct charge methodology. Aqua Services should strive to increase the percentage of charges to Aqua NJ that are direct charged as much as feasible within the current corporate service delivery arrangement.

4. **Affiliate relationship and transaction training should be formalized and increased. (See Finding 6)**

Currently, there is little training provided to employees in the areas of affiliate relationships and affiliate transactions. Affiliate transactions are a large and important segment of Aqua NJ's cost structure. As such, affiliate transactions have a high visibility with regulatory bodies and are being examined more thoroughly. The importance of affiliate relationships and transactions should not be ignored. Aqua Services and Aqua NJ employees who are involved in providing or receiving affiliate transactions need to be thoroughly trained in the rules and regulations that apply to these transactions, the policies and procedures that govern them, as well as the possible areas for miscalculations, errors, regulatory and legal issues and problems, and the potential for fraud and abuse. Training could take the form of an on-line course or more formalized classroom instruction. Once affiliate relationships and transaction training has been established, a control process should be initiated to ensure appropriate coverage and compliance on a biannual basis.

5. **Have an expert third party examine Aqua NJ's payments to Aqua America for income taxes to determine if they are equitable. (See Finding 9)**

Aqua NJ's effective Federal income tax rate for the past five years has been significantly higher than that of its parent, Aqua America. The difference in 2016 was 35.1% for Aqua NJ and 8.2% for Aqua America. Although the policy is for Aqua NJ's federal income tax to be calculated on a stand-alone basis, this discrepancy in tax rates should be examined by an expert third party to verify that Aqua NJ is receiving the appropriate tax rate.

6. **Report HomeServe product sales as Aqua NJ affiliate transactions. (See Finding 10)**

Any revenue that Aqua Resources receives as a result of HomeServe product sales to Aqua NJ ratepayers should be shared with Aqua NJ and reported as an affiliate transaction. All costs incurred by ACO in support of the HomeServe product should be charged to Aqua Resources as an affiliate transaction. Further, any cost incurred by Aqua NJ in facilitating the HomeServe product sale to its customers should be charged to Aqua Resources and reported as an affiliate transaction.