

MASSACHUSETTS WATER RESOURCES AUTHORITY

Board of Directors Report

on

Key Indicators of MWRA Performance

for

Fourth Quarter FY2017

Q1	Q2	Q3	Q4



Frederick A. Laskey, Executive Director
Michael J. Hornbrook, Chief Operating Officer
September 20, 2017

Board of Directors Report on Key Indicators of MWRA Performance

Fourth Quarter FY2017

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This quarterly report is prepared by MWRA staff to track a variety of MWRA performance measures for routine review by MWRA's board of directors. The content and format of this report is expected to develop as time passes. Information is reported on a preliminary basis as appropriate and available for internal management use and is subject to correction and clarification.

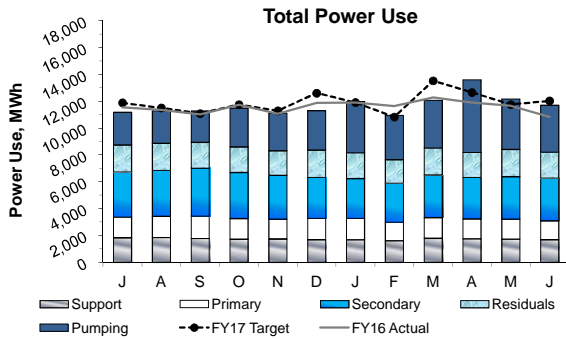
Frederick A. Laskey, Executive Director
Michael J. Hornbrook, Chief Operating Officer
September 20, 2017

OPERATIONS AND MAINTENANCE

Deer Island Operations

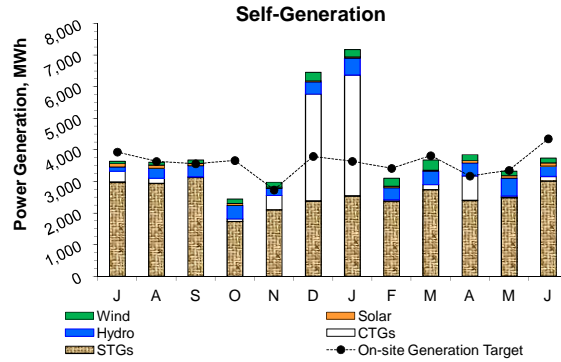
4th Quarter - FY17

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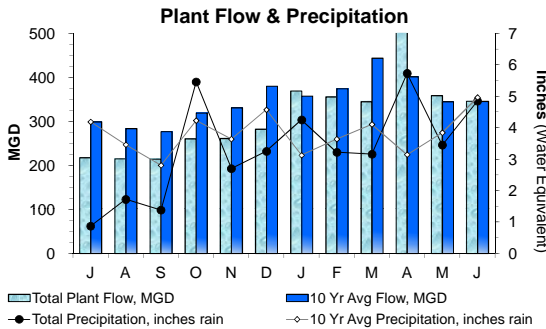


Total power usage in the 4th Quarter was 2.9% above target as Total Plant Flow was 15.8% above target with the 3 year average plant flow. Power used in all plant processes were at or below their individual targets for the quarter. Power used in wastewater pumping operations was 13.3% above target. **Overall, total power usage in FY17 was 1.8% below target as the 3 year total plant flow average was 2.0% below target.**

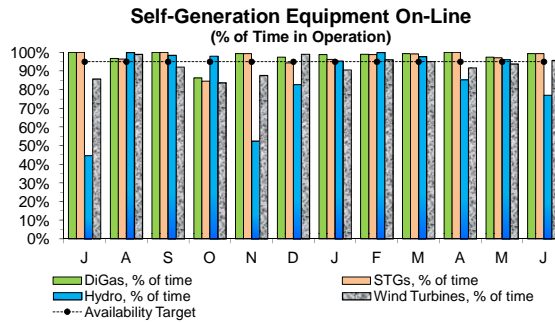
Note: Power usage projections are based on 3 year averages.



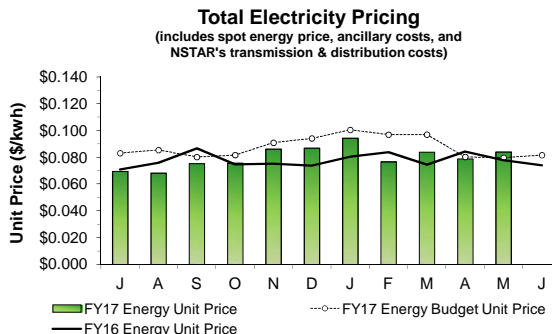
Power generated on-site during the 4th Quarter was on target (+0.4%). While generation by the STGs and CTGs met or exceeded their targets, generation by the Hydro Turbines was 22% below target as a result of mechanical and control issues. Wind Turbine generation was 10.0% below target as a result of turbulence caused by wind blowing through the digesters tripping the turbines offline occurring at a greater frequency than in past years. Solar Panel generation was 9.0% below target as the amount of radiant sunshine was approximately 11% lower than in previous years. Overall, power generation was 10.8% above target for FY17.



Total Plant Flow for the 4th Quarter was 11.3% above target with the 10 year average plant flow (405.2 MGD actual vs. 364.2 MGD expected) as precipitation for the quarter was 17.0% higher than target (14.03 inches actual vs. 11.96 inches expected). **Total Plant Flow in FY17 was 10.1% below target as precipitation was 12.4% below target.**



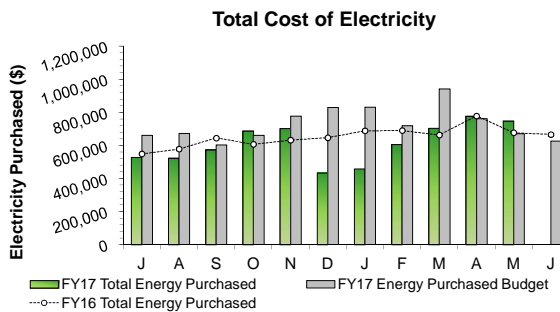
The DiGas system and STGs exceeded the 95% availability target for the 4th Quarter. Wind Turbine availability fell below target by 1.3% due to turbulence caused by wind blowing through the digesters and tripping the turbines offline. The Hydro Turbines fell 8.8% below target due to mechanical and control issues in the 4th Quarter. **Overall in FY17, the DiGas and STGs exceeded the 95% availability target, while Hydro Turbine availability was 9.3% below target and the Wind Turbines were 2.5% below target.**



Under the current energy supply contract, a block portion of DI's energy is a fixed rate and the variable load above the block is purchased in real time. An invoice for the June electricity usage has not been received yet. The actual Total Energy Unit Price in the 4th Quarter (April and May data only) was 1.8% higher than the FY17 budget estimate for the same period. The Total Energy Unit Price includes a fixed block price, spot energy price, transmission & distribution charges, and ancillary charges.

Total Energy Unit Price in FY17 through May is 9.3% lower than budget.

Note: Only the actual energy prices are reported. Therefore, the dataset lags by one (1) month due to the timing of invoice receipt.



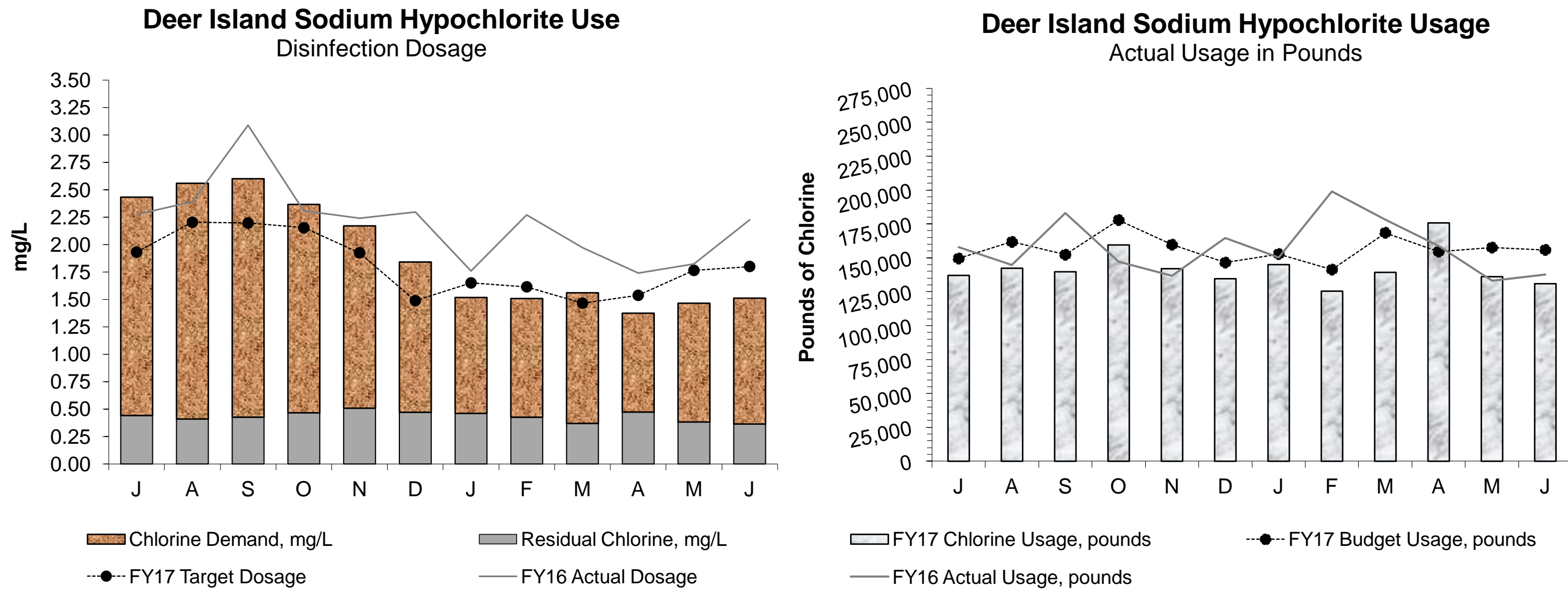
The invoices for the total cost of Electricity Purchased for June have not been received as of reporting time. The total cost of Electricity Purchased during the 4th Quarter (April and May data only) was 8.6% higher than budget. **FY17 costs through May are \$1,385,518 (17.1% lower than budgeted as the Total Energy Unit Price is 9.3% lower than budget and the Total Electricity Purchased is 7.7% lower than budget.** Total Electricity Purchased in December and January were more than 46% lower than budgeted as the cross harbor electrical cable, that supplies the primary source of power to Deer Island, was de-energized for significant portions of this period to allow Eversource to safely perform cable location and dredging work (Phase 1A and 1B of Eversource/HEEC cable location and protection project). Therefore, CTG operation, and not Electricity Purchased, was used to meet the electrical needs of the treatment plant.

Note: Only months with complete Electricity Purchased data are reported. Therefore, the dataset lags by one (1) month due to the timing of invoice receipt.

Deer Island Operations

4th Quarter - FY17

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The disinfection dosing rate in the 4th Quarter was 15.0% below the target. DITP maintained an average disinfection chlorine residual of 0.41 mg/L this quarter with an average dosing rate of 1.45 mg/L (as chlorine demand was 1.04 mg/L). Actual sodium hypochlorite usage in pounds of chlorine was 5.4% below target this quarter due to lower chlorine demand. **Overall in FY17, disinfection dosing was 5% above target while sodium hypochlorite usage in pounds of chlorine was 9.1% below target.**

The overall disinfection dosing rate (target and actual) is dependent on plant flow, target effluent total chlorine residual levels, effluent quality and NPDES permit levels for fecal coliform.

Secondary Blending Events

Month	Count of Blending Events	Count of Blending Events Due to Rain	Count of Blending Events Due to Non-Rain-Related Events	Secondary, as a Percent of Total Plant Flow	Total Hours Blended During Month
J	0	0	0	100.0%	0.00
A	0	0	0	100.0%	0.00
S	0	0	0	100.0%	0.00
O	2	2	0	99.7%	3.94
N	2	2	0	99.7%	4.50
D	1	1	0	99.9%	2.30
J	2	2	0	99.7%	8.62
F	0	0	0	100.0%	0.00
M	2	2	0	99.4%	8.54
A	3	3	0	95.2%	104.64
M	2	2	0	99.9%	5.21
J	1	1	0	99.3%	6.81
Total	15	15	0	99.1%	144.57

97.7% of all flows were treated at full secondary during the 4th Quarter. There were a total of six (6) separate secondary blending events; all due to high plant flow resulting from heavy rain. The six (6) combined blending events resulted in a total of 116.66 hours of blending and 829.59 Mgal of flow blended with secondary effluent. The Maximum Secondary Capacity for the entire quarter was 700 MGD.

Overall in FY17, 99.1% of all flows were treated at full secondary. There were a total of 15 separate secondary blending events in FY17, all due to high plant flows resulting from heavy rain. The 15 secondary blending events combined produced a total of 144.57 hours of blending and 978.43 Mgal of flow blended with secondary effluent.

Secondary permit limits were met at all times during the 4th Quarter, as well as during all of FY17.

Deer Island Operations & Maintenance Report

Environmental/Pumping:

The plant achieved an instantaneous peak flow rate of 1,238.2 MGD just after noon on April 1. This peak flow occurred during a two (2) day rain event that produced 2.43 inches of precipitation. Overall, Total Plant Flow in the 4th Quarter was 11.3% above the 10 year average plant flow target for the quarter, but 10.1% below target for FY17.

Essential maintenance and rehabilitation activities involving the replacement of butterfly flow control valves, discharge isolation valves, flow meters, and associated piping for each of the 10 wastewater pumps in the North Main Pump Station (NMPS) continued in Quarter 3. All equipment is original and dates back to the facility upgrades in 1995. Over time, the valves in these facilities have sustained damage from age and wear and must be replaced to allow proper isolation of pumps and equipment for maintenance. There were a total of seven (7) force main isolation events during the fourth quarter of FY17, to install the new equipment for Pump #2, to remove and install the new equipment for Pump #9, to remove, redesign, and then install Pump #7, and to remove the old equipment for Pump #10. NMPS, Winthrop Terminal Headworks Facility, and South System Pump Station continued to operate during these events. No interruptions or restrictions in flow occurred during this work as all north system flow was handled through the other force main in the facility. Flow through the isolated force main in NMPS was suspended at approximately 3:30 a.m. and was restored before 3:00 p.m. once the scheduled tasks for the day were completed.

Deer Island Operations

4th Quarter - FY17

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Deer Island Operations & Maintenance Report (continued)

Environmental/Pumping (continued):

Cleaning of the North Main Pump Station riser shafts occurred at the end of April. The ten-foot diameter North Metropolitan Relief Tunnel riser shaft yielded approximately two (2) cubic yards of material and the eleven-foot diameter Boston Main Drainage Tunnel riser shaft yielded nearly 15 cubic yards of material. Material was disposed utilizing a line item in the grit and screenings hauling and disposal contract. The removal of this floating material reduces the risk of pumping system malfunctions during low flow and pump-down events at the North Main Pump Station. Scheduling of this cleaning operation twice yearly in the spring and fall appears to be very successful and manageable.

On June 1 and June 29, all south system flows were diverted to South System Pump Station (SSPS) pumps 5 to 8 (wet well 2) for approximately 12 hours in order to isolate pumps 1 to 4, and complete repairs on the check valve dashpot on SSPS pump #1. Once the work was completed at the end of the day, pumps 1 to 4 were returned to operational status. A similar repair was started on SSPS pump #3 on July 19. No interruptions in flow occurred during this work.

Secondary Treatment:

Annual turnaround maintenance was performed on Train #2 at the Cryogenic Oxygen Facility in April. This turnaround maintenance is performed on roughly half of the components and systems in the Cryo Facility and allows the remaining half of the facility to continue to operate and produce oxygen uninterrupted. The same turnaround maintenance will be performed on Train #1 in the fall.

Odor Control:

Activated carbon in carbon adsorber (CAD) units #1 and #3 in the Residuals Odor Control (ROC) Facility was changed out in May as part of routine practice to replace spent carbon.

Energy and Thermal Power Plant:

Overall, total power generated on-site accounted for 29.1% of Deer Island's total power use for the month. Renewable power generated on-site (by Solar, Wind, STGs, and Hydro Turbines) accounted for 26.5% of Deer Island's total electrical power use for the month. **Overall in FY17, total power generated on-site accounted for 34.0% of Deer Island's total power use, and renewable power generated on-site accounted for 27.3% of total power use.**

The scheduled annual overhaul maintenance of CTG-1A and 2B began on May 8 along with an audit inspection of each unit. These two (2) tasks were completed simultaneously on each CTG to lessen the down time of each unit and only one (1) CTG was taken out of service at a time. This work required the engine of each CTG to be separated from the generator in order to complete the maintenance and inspection and was performed over the course of several days. Thermal Power Plant staff successfully tested each CTG following the completion of work on each unit.

On May 31, the boilers in the Thermal Power Plant were taken offline to allow DITP Maintenance staff to complete the annual dump condenser cleaning prior to placing the steam system in summer operating mode. Boiler 201 was returned to operation later that evening, following the dump condenser work, to restore steam production and steam turbine power generation.

DITP took delivery of 468,000 gallons of #2 fuel oil without incident from May 30 through June 8. This fuel oil is used for CTG operation, for boiler startup operations, and for supplemental fuel for boiler operation during periods of low or unstable digester gas production. CTG-1A was operated from approximately 9:39 A.M. to 11:17 A.M. on June 13 for an ISO-NE declared Demand Response audit event.

Regulatory:

Emissions compliance testing on the Residuals Odor Control (ROC) treatment system on DITP was conducted by consultants from June 26 to June 27. The ROC treatment system treats combined process air from the gravity thickeners and the centrifuge facility. The DITP Air Quality Operating Permit issued by the MA DEP requires that DITP conduct emissions compliance testing for the various emission units once every five (5) years to demonstrate compliance with applicable total reduced sulfur (TRS) and non-methane hydrocarbon (NMHC) emission limits. This testing requires the continuous emissions monitoring of the inlet and outlet of the odor control system over a 24-hour period for TRS at the outlet (stack) of the odor control system and for NMHC at the inlet. NMHC were also tested at the stack and the inlet was sampled for target Volatile Organic Compounds (VOCs). All the preliminary test results show that DITP was in compliance. The draft report summarizing the test results is currently being prepared by the consultants.

A MA DEP staff person was on site at the DITP on June 22 and 27 for an announced site visit to review and inspect the plant's equipment in reference to DITP's air operating permit. He was given a comprehensive tour of the Thermal Power Plant, Residuals Odor Control (ROC) Facility, as well as other areas, and was provided raw data used for generating emissions compliance reports as requested. Initial communications indicate the inspection had gone well and no issues were raised by the DEP.

On June 25, the MWRA received official notification confirming DITP's achievement for earning NACWA's (National Association of Clean Water Agencies) Platinum Award for Peak Performance which recognizes member agency facilities for outstanding compliance of their National Pollutant Discharge Elimination System (NPDES) permit limits. The Platinum award is given to agencies in recognition of 100% compliance with NPDES permits over a consecutive five year period. Deer Island earned the Platinum Award¹⁰ for having operated with no permit violations from 2007 through 2016.

Clinton AWWTP:

Phosphorus Reduction Facility:

Work completed or in progress during the fourth quarter: Plumbing contractor completed installation of natural gas lines to each building. This will replace the fuel oil for building heat and backup heat source for digesters. Installed new natural gas burners in the Administration and Dewatering buildings. Installed new polymer feed systems. Installed rapid mix, flocculation and coagulation mixers. Installed disk filter control panels.

Digester Building:

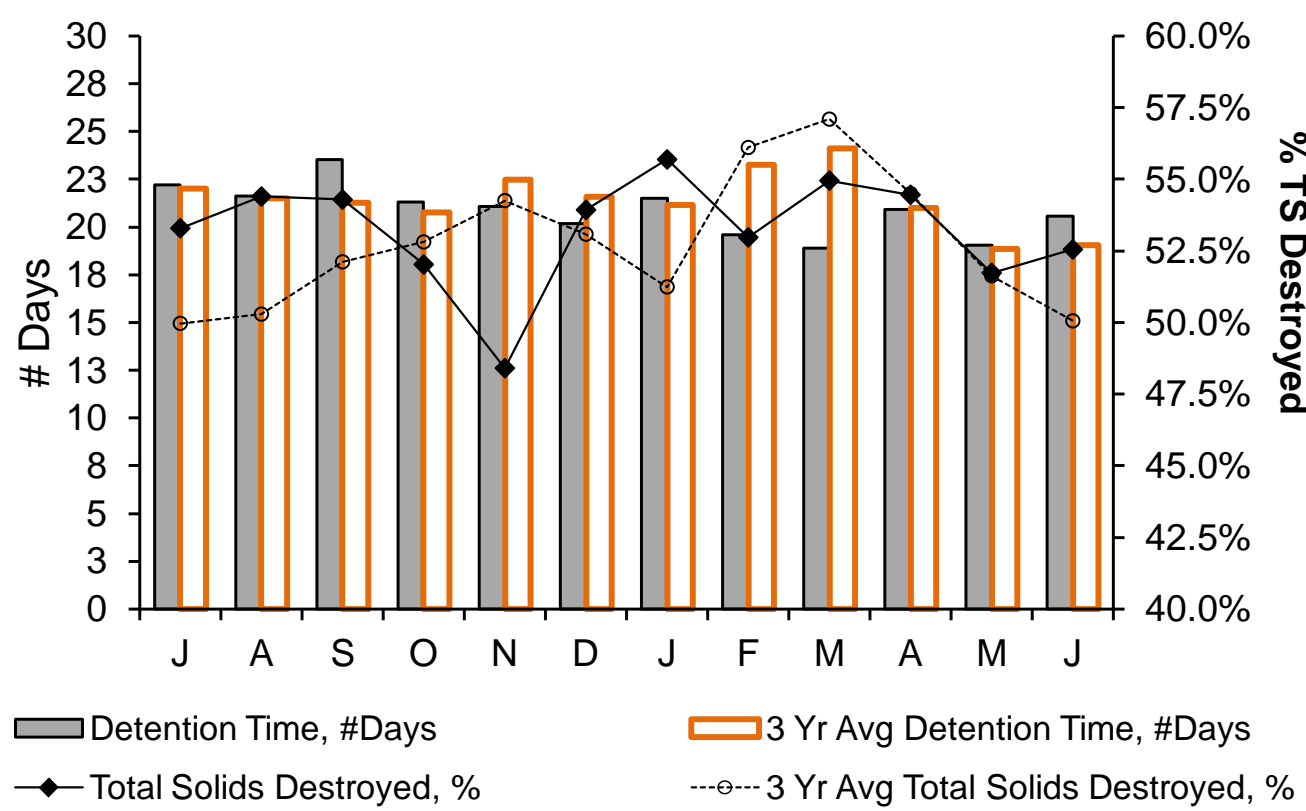
Installed new gas regulator valves on digester sludge heaters. Replaced both methane gas flares for the digesters.

Deer Island Operations and Residuals

4th Quarter - FY17

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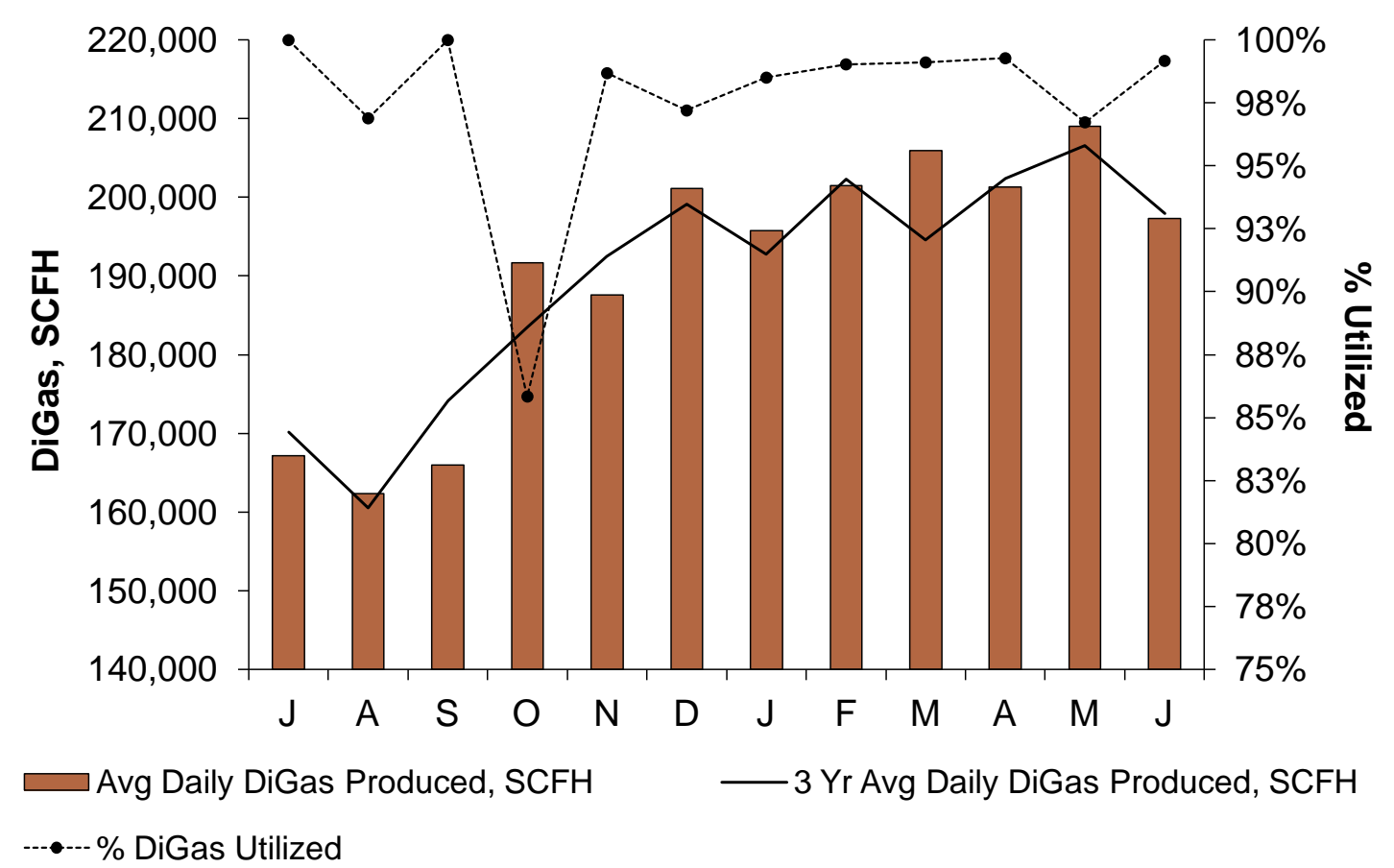
Sludge Detention Time in Digesters and Total Solids Destruction



Total solids (TS) destruction following anaerobic sludge digestion averaged 52.9% during the 4th Quarter, on target with the 3 year average of 52.1% for the same period, as the sludge detention time in the digesters was 20.2 days. DI operated with an average of 8.0 digesters during the 4th Quarter, on target with the 3 year average. **Overall in FY17, TS destruction averaged 53.2%, higher than the 3 year average of 52.8%, even though sludge detention time was 20.9 days, lower than the 3 year average of 21.4 days.**

Total solids (TS) destruction is dependent on sludge detention time which is determined by primary and secondary solids production, plant flow, and the number of active digesters in operation. Solids destruction is also significantly impacted by changes in the number of digesters and the resulting shifting around of sludge.

Digester Gas Production and % Utilized

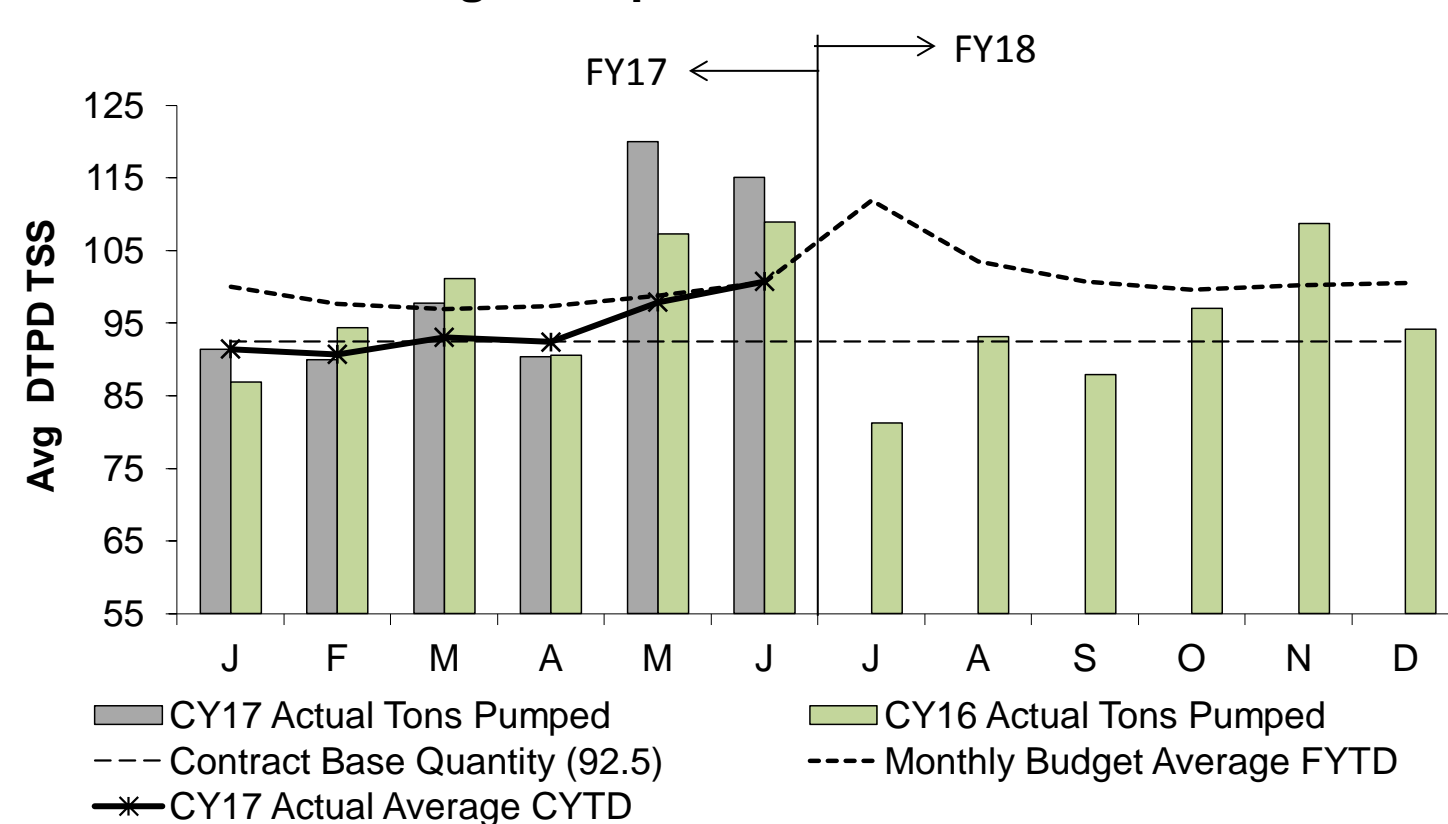


The Avg Daily DiGas Production in the 4th Quarter was on target with the 3 Year Avg Daily DiGas Production. On average, 98.4% of all the DiGas produced in the quarter was utilized at the Thermal Power Plant. DiGas utilization was slightly lower in May due to scheduled maintenance requiring both boilers to be taken off line for approximately 17 hours. **Overall in FY17, the Avg Daily DiGas Production was also on target (+0.5%), with 97.5% of all the DiGas produced utilized at the Thermal Power Plant.**

Residuals Pellet Plant

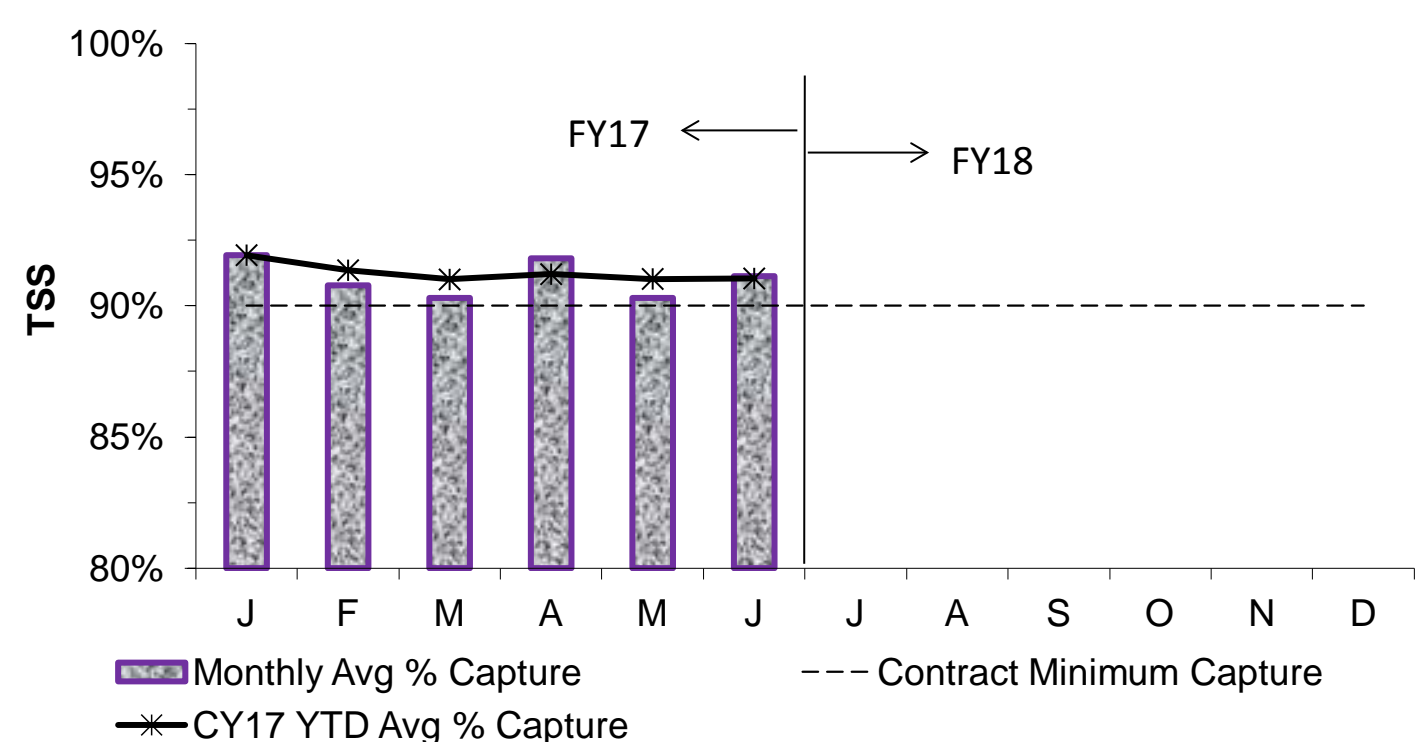
MWRA pays a fixed monthly amount for the calendar year to process up to 92.5 DTPD/TSS as an annual average. The monthly invoice is based on 92.5 DTPD/TSS (Dry Tons Per Day/Total Suspended Solids) times 365 days divided by 12 months. At the end of the year, the actual totals are calculated and additional payments are made on any quantity above the base amount. The base quantity of 90.0 DTPD/TSS was changed to 92.5 DTPD/TSS starting on January 1, 2016 with the terms of the new contract. On average, MWRA processes more than 92.5 DTPD/TSS each year (FY17's budget is 100.6 DTPD/TSS and FY18's budget is 99.5 DTPD/TSS).

Sludge Pumped From Deer Island



The average total quantity of sludge pumped to the Pellet Plant in the 4th Quarter of FY17 was 108.5 DTPD - above target with FY17's average budget of 100.6 DTPD. **Overall in FY17, the average total amount of sludge pumped from Deer Island was 97.2 DTPD, 3.4% lower than the target of 100.6 DTPD**

Monthly Average % Capture of Processed Sludge

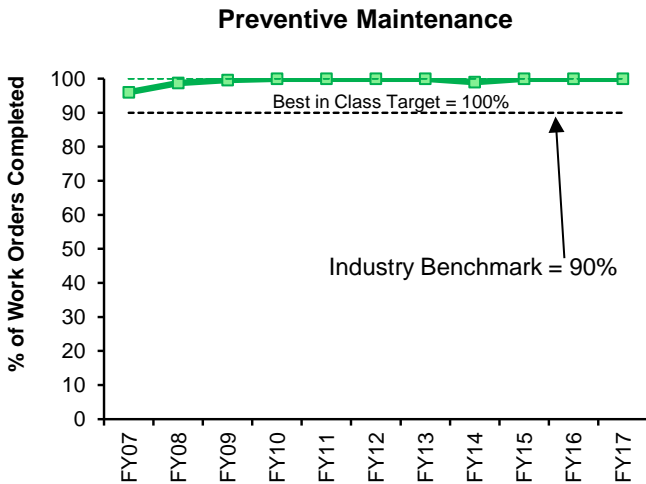


The contract requires NEFCo to capture at least 90.0% of the solids delivered to the Biosolids Processing Facility in Quincy. The CY17 to date average capture is 91.0%.

Deer Island Yearly Maintenance Metrics

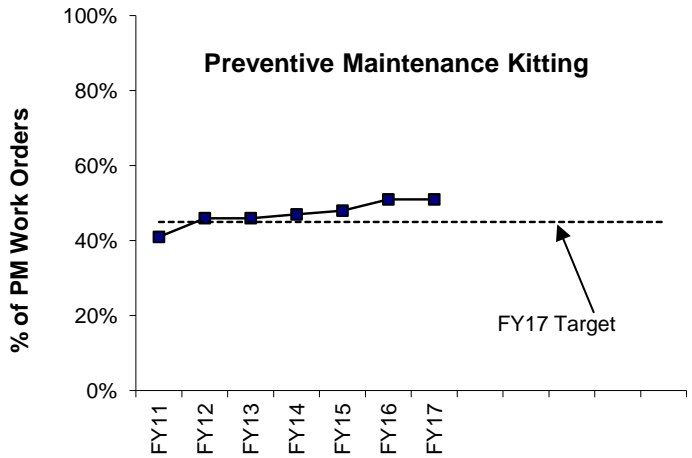
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Proactive and Productivity Measures

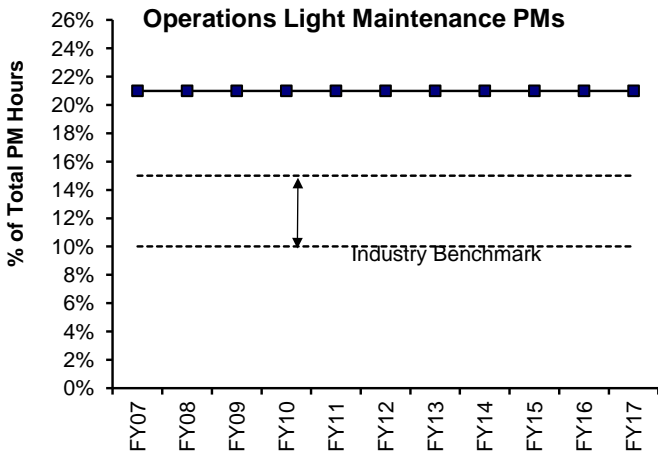


The industry benchmark is 90% for Preventive Maintenance (PM) completion. Upon reaching the 90% goal in FY05, the target goal was increased to the "Best in Class" Target of 100% PM completion. Since then, the percentage of PM work order completion has been at 99% or higher.

Reliability-Centered Maintenance (RCM) and PM optimization efforts have continued since FY01. PM

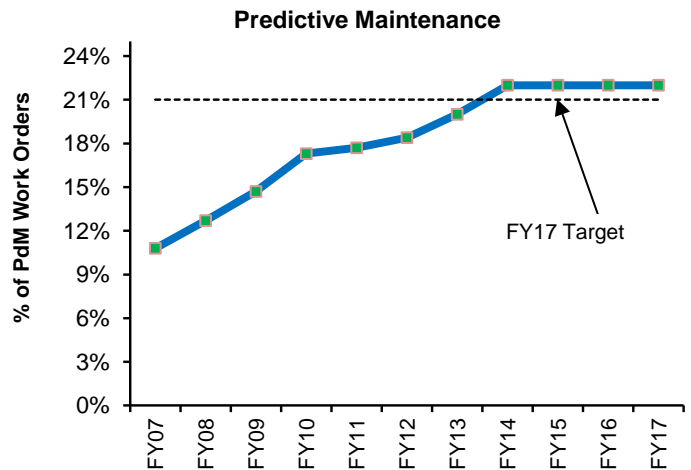


Preventive Maintenance (PM) inventory items were loaded into Maximo to assign spare parts for equipment to PM work orders. DITP reached the PM kitting goal of 100% in FY10. In FY11 a new graph (above) was developed to track kitting of all maintenance work orders in an effort to increase wrench time. Staff continues to fine-tune the process to "kit" all maintenance work orders. Kitting is considered a best practice by maintenance and reliability professionals. It entails staging parts necessary to complete maintenance work. Kitting allows maintenance staff to spend more time "turning the wrench" and less time waiting for parts at the stockroom window. Kitting for FY17 was 51%, surpassing DITP's goal of 48%.



The percentage of preventive maintenance work order hours completed by Operations staff (not maintenance staff) increased from less than 1% in January 2002 to the current level of 21% in FY17.

DITP reached the industry benchmark range of 10-15% in April 2003 and has exceeded the goal through FY17. Operations completes approximately 600 PM work orders per month.



Predictive maintenance has steadily increased from 2% in FY03 to 22% in FY17, surpassing DITP's FY17 goal of 21%.

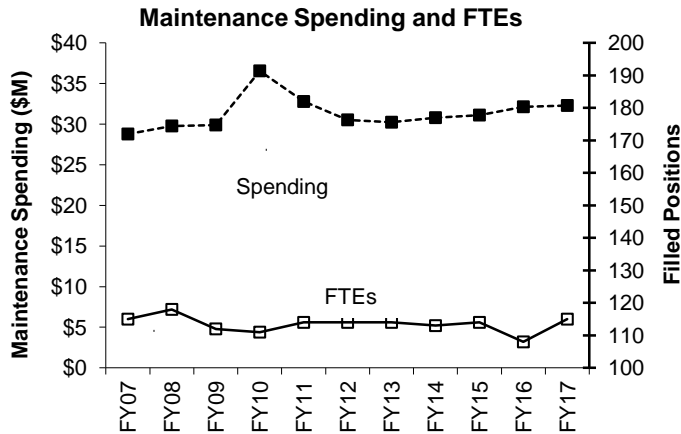
The increase in predictive maintenance was achieved through the expanded use of lubrication, vibration, thermography, and acoustic ultrasonic testing techniques.

The Condition Monitoring Group continually reviews and investigates new opportunities and initiatives to expand condition monitoring testing and analysis.

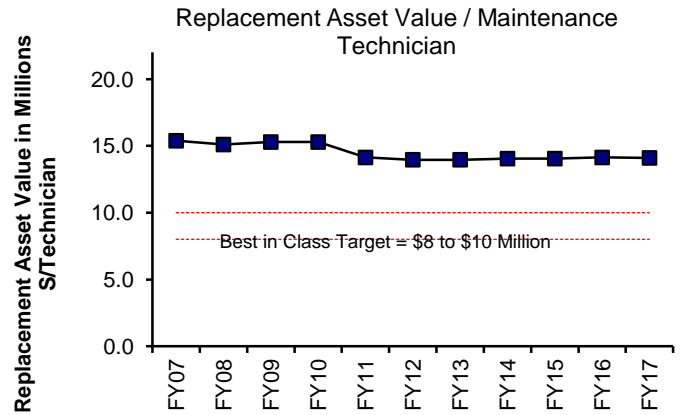
Deer Island Yearly Maintenance Metrics

4th Quarter - FY17

Overall Maintenance Program Measures

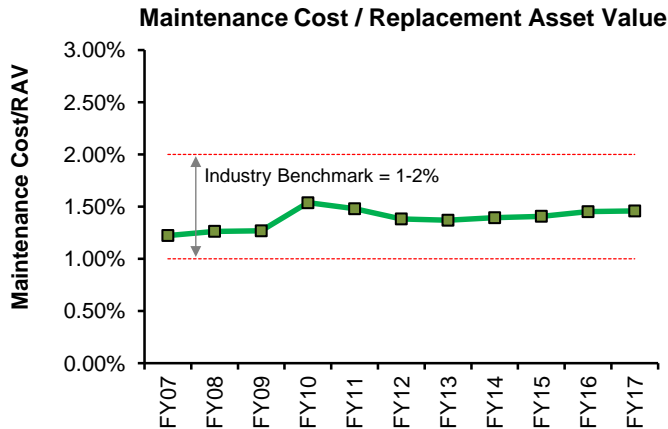


DITP's Maintenance staff is currently at 115 FTE's. Maintenance has been successful in meeting its goals through implementation of numerous maintenance efficiencies including: Operations staff performing light maintenance, cross-functional training and flexibility, and Reliability-Centered Maintenance.

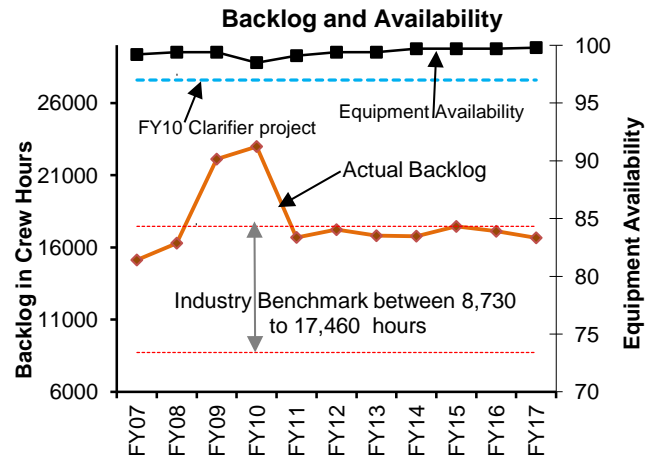


DITP adopted a "best in class" target of \$8-\$10 Million/Technician for maintenance staffing. Even after a period of downward trending, DITP remains above this Best in Class target range. However, as the plant ages and additional equipment replacements are expected, DITP management will reassess staffing as needed.

The Maintenance Spending graph shows actual annual maintenance spending and large CIP asset replacements (equipment costs only). Maintenance budgeting continues to evaluate plant assets and requirements for replacement of obsolete equipment to ensure the plant operates at maximum efficiency. In FY17, overall spending slightly increased from FY16 due to an increase in Maintenance Projects. Scheduled projects during FY17 included: Grit Classifier Cover Rehabilitation Project, East and West Odor Control Acid Wash Piping Prefabrication/Installation, Waste Gas Burners Gas Valve Replacement and the Scum Wet Wells Chopper Pump Replacements.



The industry benchmark for annual maintenance spending is between 1% to 2% of replacement asset value, currently DITP is at 1.46%. The plant's replacement asset value is calculated at approximately \$2.4 billion dollars. DITP's current maintenance spending is within the industry benchmark. As the plant ages and equipment replacement is required, spending is expected to increase. DITP Maintenance CEB spending is \$12.5 million coupled with CIP spending which funded Grit Classifier Cover Rehabilitation Project, East and West Odor Control Acid Wash Piping Prefabrication/Installation, Waste Gas Burners Gas Valve Replacement, Pump Stations Valve Replacement Project, and Digester Sludge Pump Replacements.



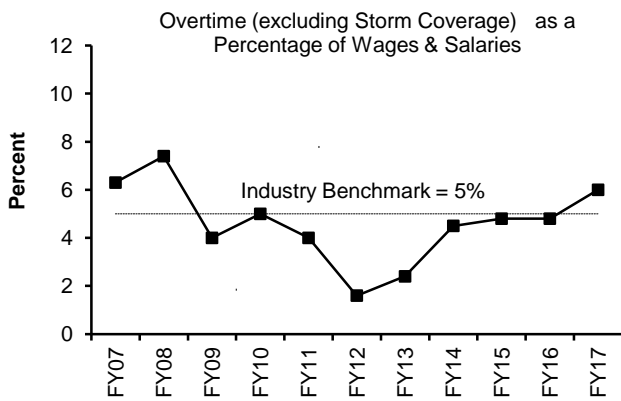
Industry benchmark for Equipment Availability are 97% and over the last ten years, equipment availability has consistently exceeded the benchmark. In FY17 the availability was 99.8%, the highest availability to date.

Industry Benchmark for Backlog is between 8,730 to 17,460 hours for maintenance based on current staffing, the total average backlog for FY17 was 16,666 hours, which is slightly below the industry benchmark. The slight decrease in backlog is from utilizing staff during Eversource Cable Outage to perform light maintenance tasks.

Deer Island Yearly Maintenance Metrics

4th Quarter - FY17

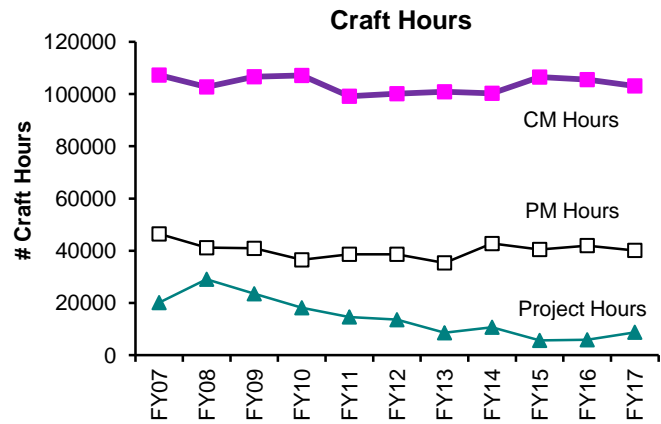
Overall Maintenance Program Measures (cont.)



Management continues its effort to keep overtime below the industry benchmark. DITP maintenance overtime was 6% for FY17. Management has taken steps to reduce overtime spending by limiting overtime to repair critical equipment and systems only.

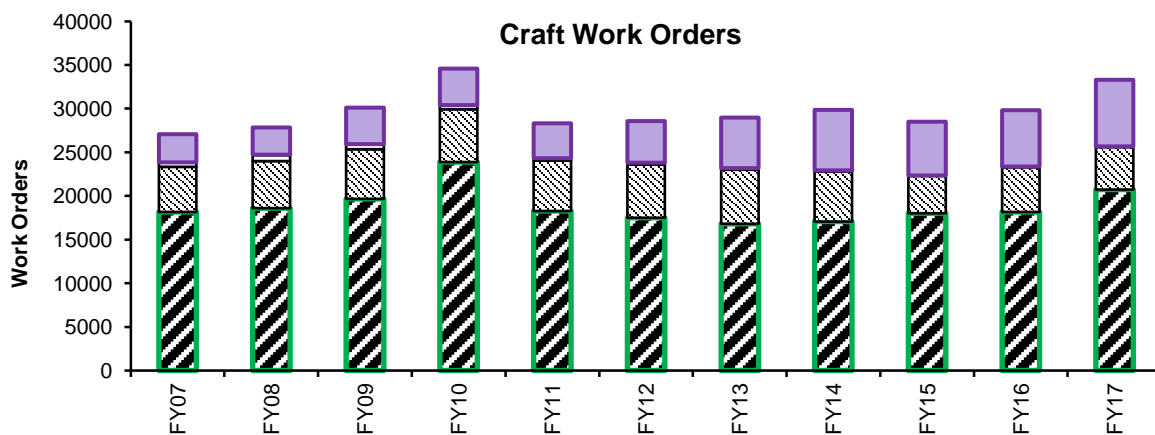
DITP has been on or under Industry Benchmark from FY09 through FY16.

The increase in overtime in FY17 was due to the Eversource Cable Outage Project.



Continued optimization of the Preventive Maintenance (PM) program through the transfer of some light maintenance tasks from Maintenance to Operations staff (21% of PM hours at the end of FY17), elimination of duplicate work orders, increasing PM frequency due to equipment history and performance. Reliability-Centered Maintenance (RCM) recommendations resulted in a significant decrease of 6,303 hours in maintenance staff PM hours from FY07 to FY17.

Corrective Maintenance (CM) hours decreased from last year due to additional maintenance projects. Project Maintenance hours increased due to large HVAC Equipment Replacement, Grit Classifier Cover Rehabilitation, Upgraded Acid Washing Piping System, New Gas Valves for Gas Burners and Centrifugal Chopper Pump Replacement Projects.



■ Predictive Maintenance
 ■ Emergency Maintenance
 ■ Project
 ■ Corrective Maintenance
 ■ Preventive Maintenance

During FY17, the number of work orders increased by 3,391 from the previous year primarily due to the increase in Predictive Maintenance work orders (CBM) associated with the Condition Monitoring Program. The number of Corrective Maintenance (CM) work orders decreased slightly in FY17. Project (PROJ) work orders increased for FY17 due to additional maintenance projects scheduled.

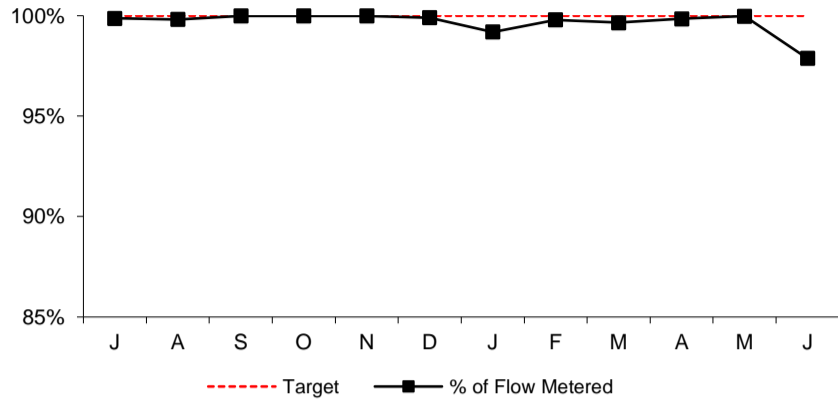
The DI Planning Unit, is continuously modifying PM, PdM, CM and CBM Job Plans to ensure maintenance is being performed efficiently and effectively, while ensuring reliability and availability of DITP's Assets.

Operations Division Metering & Reliability

4th Quarter - FY17

WATER METERS

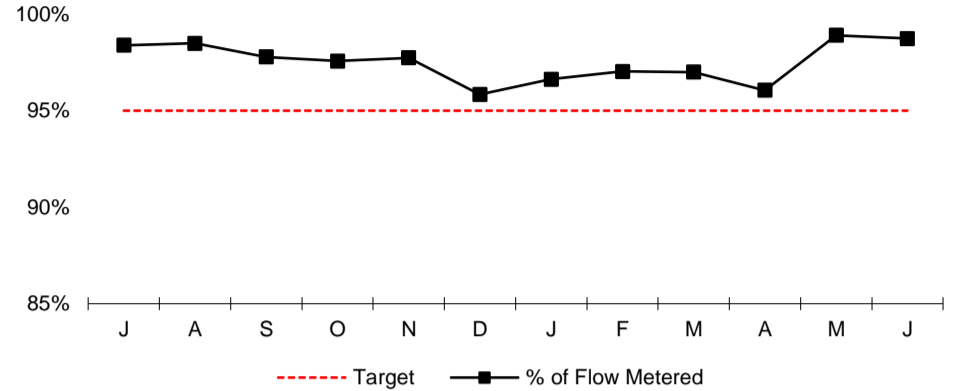
Percent of Total Revenue Water Deliveries Calculated Using Meters



The target for revenue water deliveries calculated using meters is 100%. Estimates are generated for meters that are out of service due to instrumentation problems or in-house and capital construction projects. During the 4th Quarter FY17, meter actuals accounted for 99.23% of flow; only 0.77% of total revenue water deliveries were estimated. Estimation in June due primarily to a Norwood construction project. The following is the breakdown of reasons for estimations: In-house and Capital Construction Projects - 1.08% Instrumentation Failure - .08%

WASTEWATER METERS

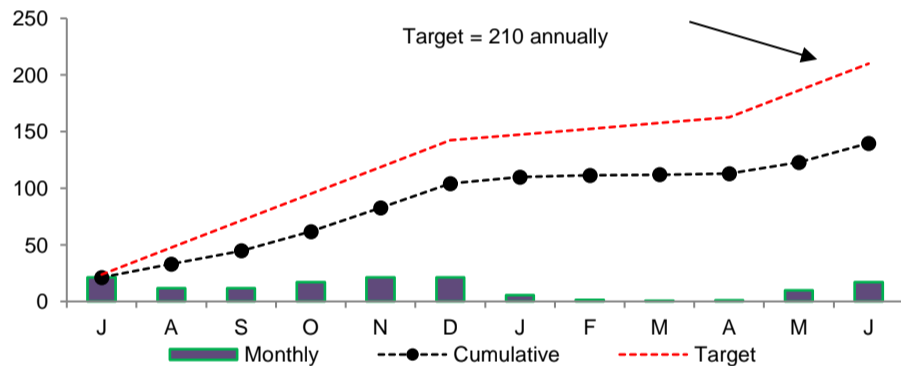
Percent of Total Wastewater Transport Calculated Using Meters



The target for revenue wastewater transport calculated using meters is 95%. Estimates are generated for meters missing data due to instrument failure and/or erratic meter behavior. Estimates are produced using data from previous time periods under similar flow conditions. During the 4th Quarter of FY17, meter actuals accounted for 97.90% of flow; only 2.10% of wastewater transport was estimated.

WATER DISTRIBUTION SYSTEM PIPELINES

Miles Surveyed for Leaks



During the 4th Quarter of FY17 27.8 miles of water mains were inspected. The total inspected for the fiscal year to date is 139.76 miles. Surveyed below target due to extensive community leak detection support.

Leak Backlog Summary

Month	J	A	S	O	N	D	J	F	M	A	M	J
Leaks Detected	3	2	2	3	3	3	0	0	3	2	1	0
Leaks Repaired	1	1	1	4	2	2	2	1	1	4	1	1
Backlog	7	8	9	8	9	10	8	7	9	7	7	6
Avg. Lag Time	24.9	42.3	36.7	41.3	45.2	51.9	62.3	70.6	67.4	69.2	72.6	78.3

During the 4th Quarter of FY17, three leaks were detected and six repaired. Six leaks remain unrepaired, of which, two are carried over from FY15. Refer to Leak Report below. Additionally during Q4 community assistance, (i.e. individual leak location work to hydrant surveys) was provided to the following communities.

- April: Arlington, Canton, Malden, Medford, Newton and Revere.
- May: Brookline, Canton, Medford, Revere and Somerville.
- June: Boston, DCR-Clinton, Lynn and Newton.

FY17 Leak Report

Date Detected	Location of Leaks	Repaired	Date Detected	Location of Leaks/Unrepaired
07/22/16	69 Riverside Avenue, Medford	07/29/16	6/8/2015	Allandale Rd. @ Grove St., Brookline, Sect 78, located acoustically, not surfacing
01/11/15	Arborway @ St. Joseph St., West Roxbury	08/15/16	6/17/2015	Washington St at East St, Dedham; Sect 77, located acoustically, not surfacing, need redundant SEH pipeline to enable isolation
09/15/17	West Squantum @ Amsterdam Ave., Quincy	09/20/16	7/01/2016	Forest St, Winchester, Sect 89, leaking blow off valve, not surfacing need redundant NIH pipeline to enable isolation
10/12/16	Prospect St at Sun St, Waltham	10/13/16	7/26/2016	Res. Playground, Cleveland Circle, in softball outfield, Fisher Hill main leaking into drain, not surfacing, need to repair in winter
10/13/16	1025 West Roxbury Parkway, Brookline	10/17/16	12/04/2016	1025 W Rxbry Pkwy, Brookline, Sect 95, located coustically, not surfacing, leaking blow off valve
08/11/16	Lee St at Boylston St, (Rte 9), Brookline	10/20/16	12/04/2016	710 Ashland St/Summer St, Lynn, Sect 91, not surfacing, leaking emergency connection valve between MWRA and LWSC systems LWSC has difficulty isolating 16" main.
10/18/16	West St at Lagrange St, West Roxbury	10/26/16		
11/02/16	Morton St at Blue Hill Ave, Dorchester	11/07/16		
06/01/16	Commonwealth Ave at Oakland Ave, Newton	11/30/16		
11/06/16	2 Lynn Fells Parkway, Near W. Wyoming, Stoneham	12/22/16		
11/06/16	122 Lynn Fells Parkway at Youle St, Melrose	12/30/16		
09/28/16	Quinobequin Rd at Rte 128, Newton	01/04/17		
12/20/16	Main St at Madison, Malden	01/09/17		
08/30/16	Morton St at American Legion Hwy, W. Roxbury	02/22/17		
07/16/15	Capt Robt Cook Drive, Needham, Sect 80	03/15/17		
03/22/17	Route 128 NB Newton, Sect 80	04/03/17		
03/27/17	Recreation Rd, Weston, Sect 80	04/07/17		
04/22/17	Section 80, Grove St, Newton	04/22/17		
03/20/17	Section 39, 335 Hyde Park Ave	04/24/17		
04/09/17	Morton St., Dorchester, Section 58, line isolated	05/04/17		
05/15/17	Beach Street, @ Eaton Street, Revere	06/07/17		

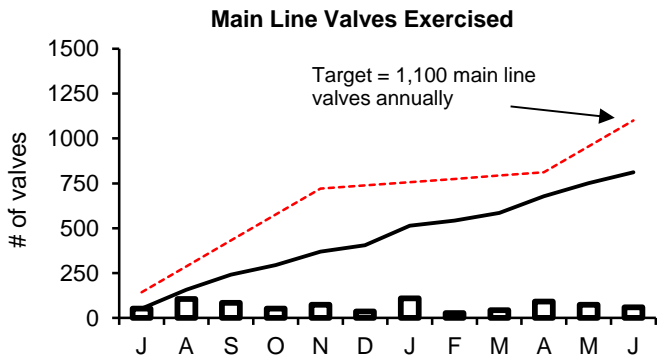
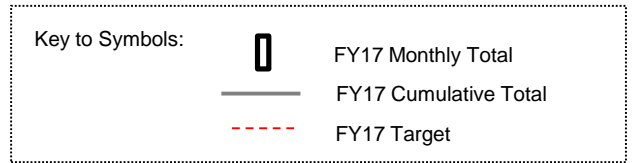
Water Distribution System Valves

4th Quarter - FY17

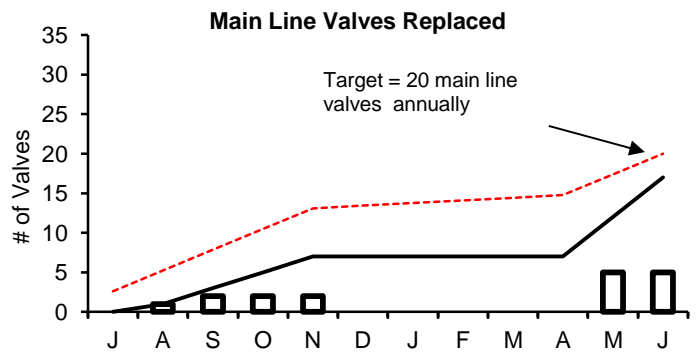
Background

Valves are exercised, rehabilitated, or replaced in order to improve their operating condition. This work occurs year round. Valve replacements occur in roadway locations during the normal construction season, and in off-road locations during the winter season. Valve exercising can occur year round but is often displaced during the construction season. This is due to the fact that a large number of construction contracts involving rehabilitation, replacement, or new installation of water lines, requires valve staff to operate valves and assist with disinfection, dechlorination, pressure-testing, and final acceptance. Valve exercising can also be impacted due to limited redundancy in the water system; valve exercising cannot be performed in areas where there is only one source of water to the community meters or flow disruptions will occur.

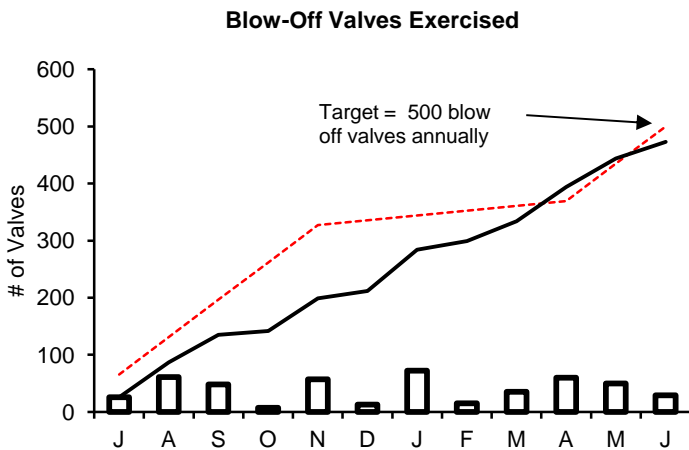
Type of Valve	Inventory #	Operable Percentage	
		FY17 to Date	FY17 Targets
Main Line Valves	2,159	95.7%	95%
Blow-Off Valves	1,317	97.4%	95%
Air Release Valves	1,380	94.6%	95%
Control Valves	49	100.0%	95%



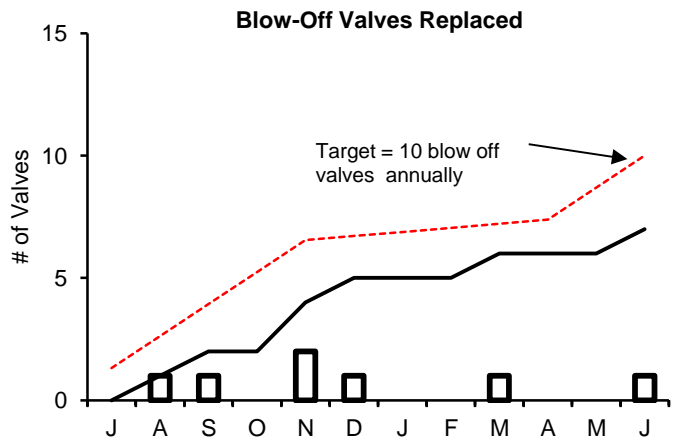
During the 4th Quarter of FY17, staff exercised 225 main line valves. The total exercised for the fiscal year is 811. Below target due to high priority CIP projects.



During the 4th Quarter of FY17, staff replaced ten main line valves. The total replaced for the fiscal year is 17. Below target due to non-valve replacement project, e.g. Deer Island rip rap work.



During the 4th Quarter of FY17, staff exercised 139 blow off valves. The total exercised for the fiscal year is 473.



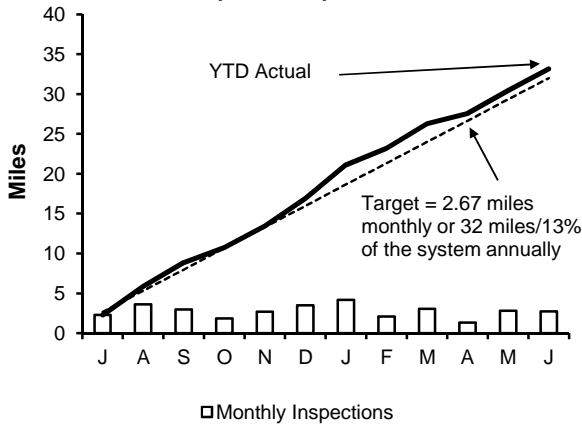
During the 4th Quarter of FY17, staff replaced one blow off valve. The total replaced for the fiscal year is seven. Below target due to non-valve replacement project, e.g. DITP rip rap work.

Wastewater Pipeline and Structure Inspections and Maintenance

4th Quarter - FY17

Inspections

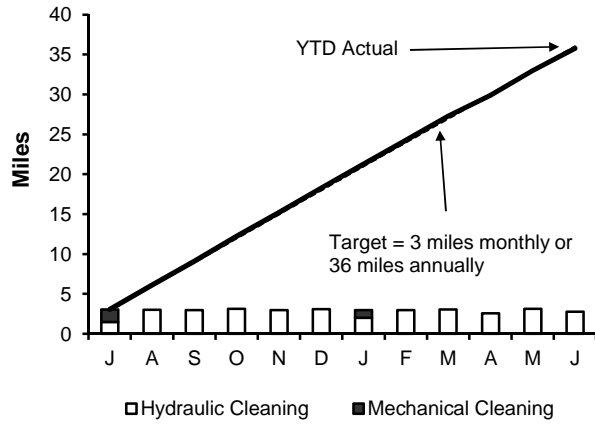
Pipeline Inspections



Staff internally inspected 6.89 miles of MWRA sewer pipeline during this quarter. The year to date total is 33.17 miles. Community Assistance was provided to the city of Somerville(287' of 12" sewer) and Cambridge(100' of 12" sewer) this quarter.

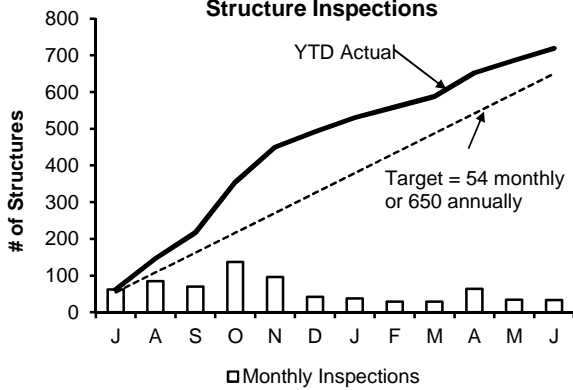
Maintenance

Pipeline Cleaning



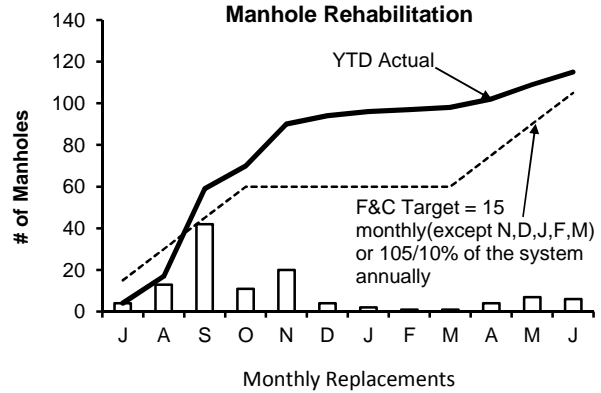
Staff cleaned 8.47 miles of MWRA's sewer system and removed 40 yards of grit and debris during this quarter. The year to date total is 35.78 miles. No Community Assistance was provided this quarter.

Structure Inspections



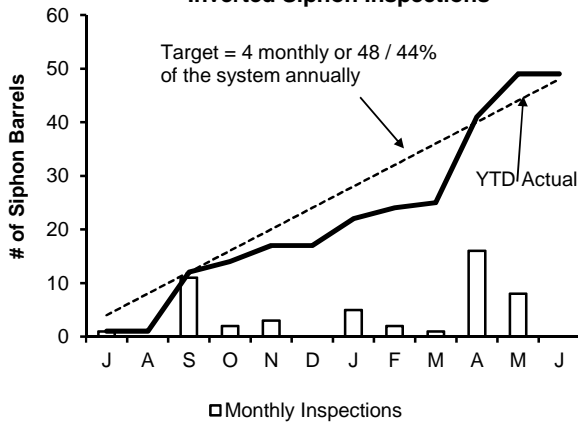
Staff inspected the 36 CSO structures and performed 131 additional manhole/structure inspections during this quarter. The year to date total is 719 inspections.

Manhole Rehabilitation



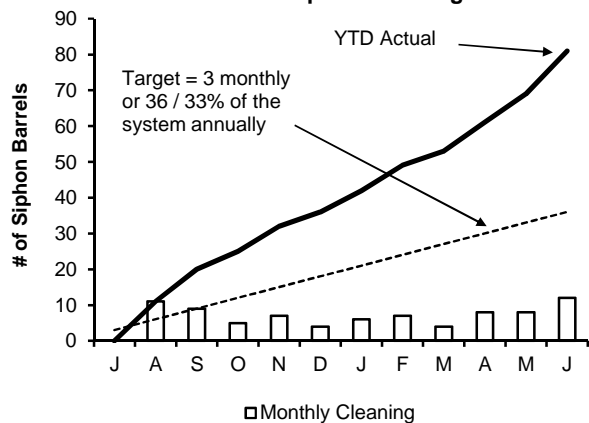
Staff replaced 17 frames & cover during this quarter. The year to date total is 115.

Inverted Siphon Inspections



Staff inspected 24 siphon barrels this quarter. Year to date total is 49 inspections.

Inverted Siphon Cleaning

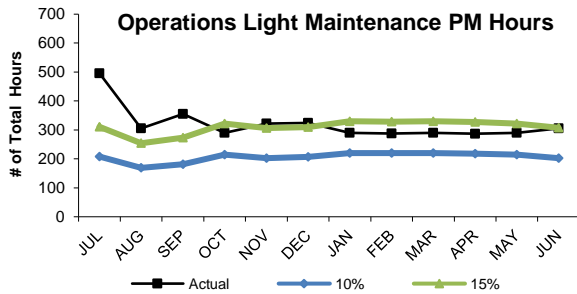


Staff cleaned 28 siphon barrels during this quarter. Year to date total is 81.

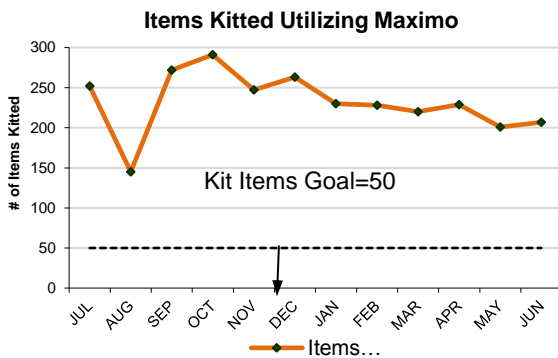
Field Operations' Metropolitan Equipment & Facility Maintenance

4th Quarter - FY17

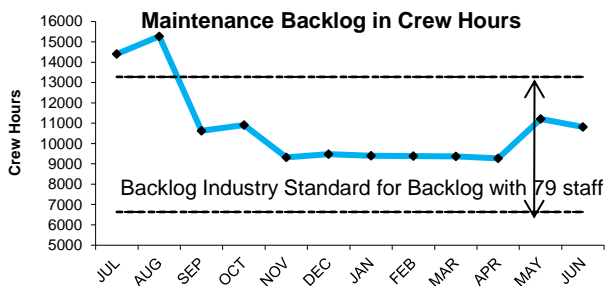
Several maintenance and productivity initiatives are in progress. The goal for the Overall PM completion and the Operator PM completion was raised to 100% for Fiscal Year 2010. The Operator PM and kitting initiatives frees up maintenance staff to perform corrective maintenance and project work, thus reducing maintenance spending. Backlog and overtime metrics monitor the success of these maintenance initiatives.



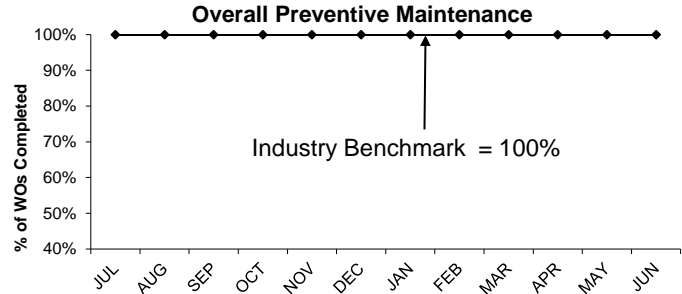
Operations staff averaged 294 hours of preventive maintenance during the 4th Quarter, an average of 14% of the total PM hours for the 4th Quarter, which is within the industry benchmark of 10% to 15%.



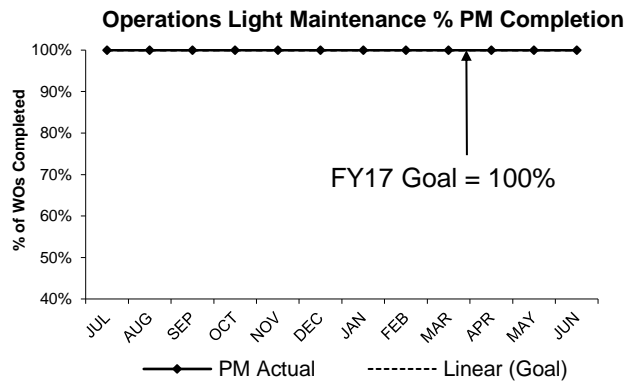
In an effort to more efficiently complete work, maintenance staff and work coordination staff have utilized the Lawson/Maximo interface to better kit stock and non stock material. The goal for FY17 is to "kit" 50 stock and non stock items total per month. An average of 212 items were kitted during the 4th Quarter



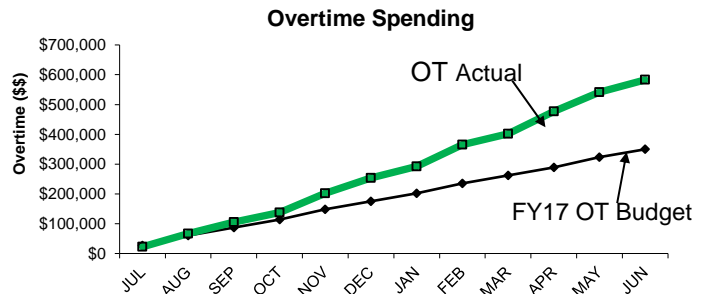
The 4th Quarter backlog average is 10431 hours. Management's goal is to continue to control overtime and still stay within the industry benchmark of 6450 to 12,940 hours.



The Field Operations Department (FOD) preventive maintenance goal for FY17 is 100% of all PM work orders. Staff completed an average of 100% of all PM work orders in the 4th Quarter.



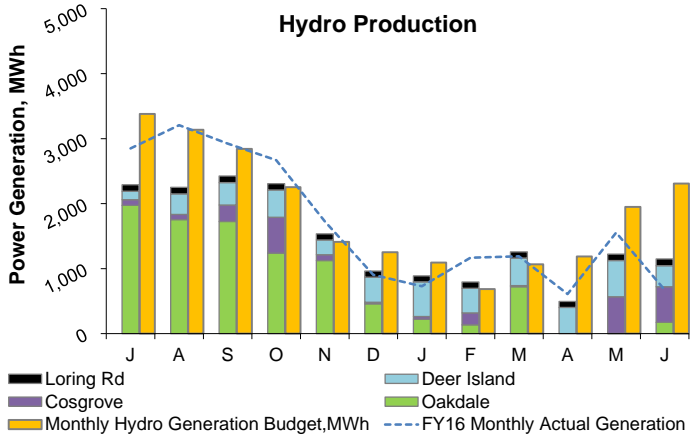
Wastewater Operators complete light maintenance PM's which frees up maintenance staff to perform corrective maintenance. Operations' FY17 PM goal is completion of 100% of all PM work orders assigned. Operations completed an average of 100% of PM work orders in the 4th Quarter.



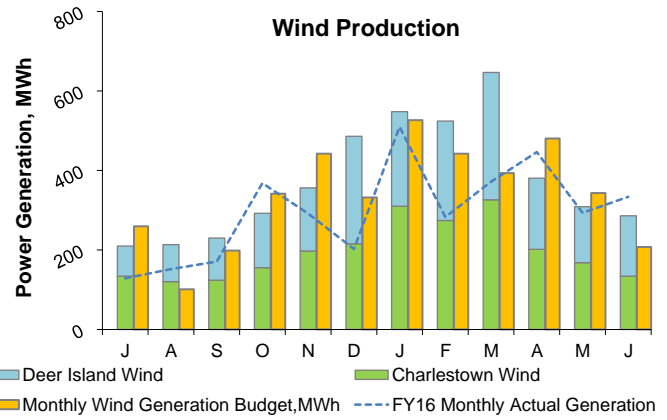
Maintenance overtime was \$94k over budget for the 4th Quarter and \$233k over budget for FY17. Overtime was used for staging wet weather events and performing critical maintenance repairs. The year end total of overtime spending was \$583k for FY17.

Renewable Electricity Generation: Savings and Revenue

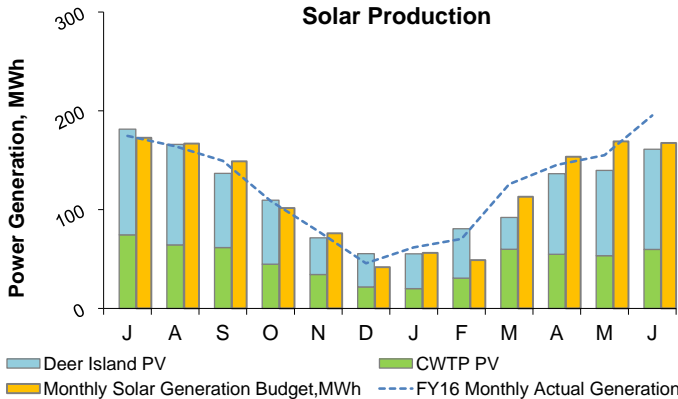
4th Quarter - FY17



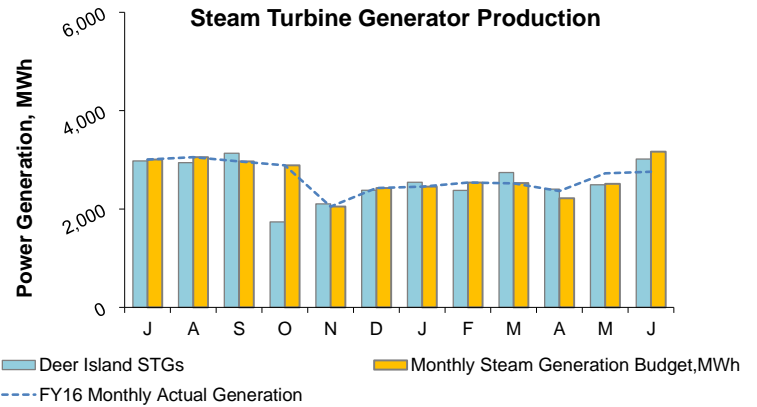
In the 4th quarter, the renewable energy produced from all hydroelectric facilities totaled 2,867 MWh; 47% below budget³. The total energy produced in FY17 is 17,578 MWh; 22% below budget³, partly due to Cosgrove operating at a lower rate for scheduled testing, and both Deer Island hydro turbines being temporarily off-line due to mechanical issues (during the first quarter). Oakdale was also offline for most of the 4th Quarter due to transformer replacement and turbine maintenance. The total savings and revenue² to date in FY17 (actuals through May¹) is \$653,472; 43% below budget³, partly due to the fact that the actual electricity unit price for Deer Island has been 9% below the budgeted³ estimate for the same period and due to the reasons stated above. The savings and revenue value does not include RPS REC revenue (see next page).



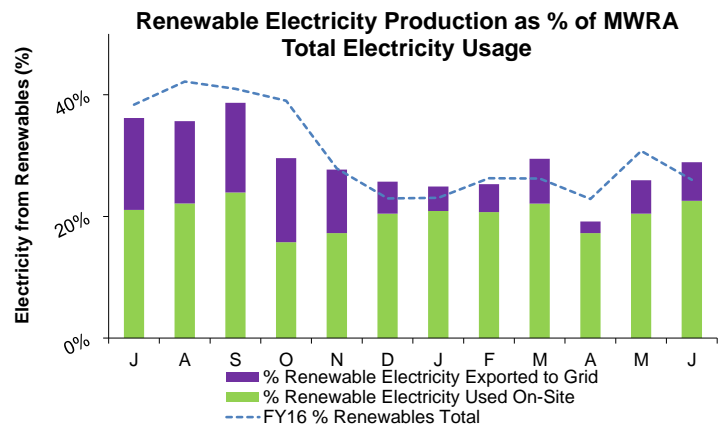
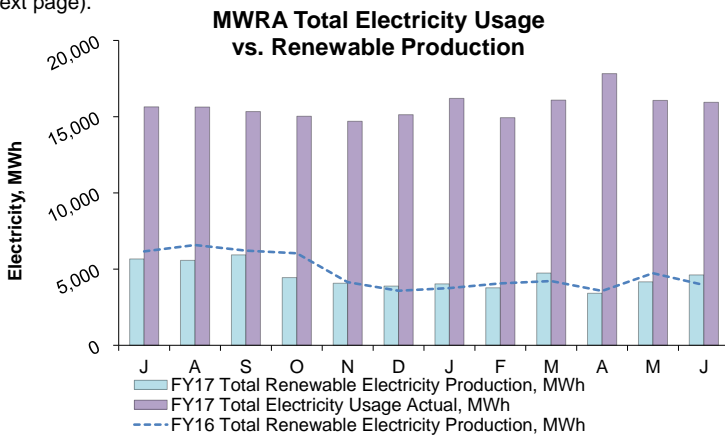
In the 4th quarter, the renewable energy produced from all wind turbine generators totaled 976 MWh; 5% below budget³. The total energy produced in FY17 is 4,483 MWh; 10% above budget³. The total savings and revenue² to date in FY17 (actuals through May¹) is \$577,823; 6% above budget³. The savings and revenue value does not include RPS REC revenue (see next page).



In the 4th quarter, the renewable energy produced from all solar PV systems totaled 437 MWh, 11% below budget³. The total energy produced in FY17 is 1,386 MWh; 2% below budget³. The total savings and revenue² to date in FY17 (actuals through May¹) is \$139,642; 2% below budget³. The savings and revenue value does not include RPS REC revenue (see next page).



In the 4th quarter, the renewable energy produced from all steam turbine generators totaled 7,914 MWh, equal to budget³. The total energy produced in FY17 is 30,862 MWh; 3% below budget³. The total savings and revenue² to date in FY17 (actuals through May¹) is \$2,214,925; 12% below budget³, partly due to the fact that the actual electricity unit price for Deer Island has been 9% below the budgeted³ estimate for the same period. The savings and revenue value does not include RPS REC revenue (see next page).

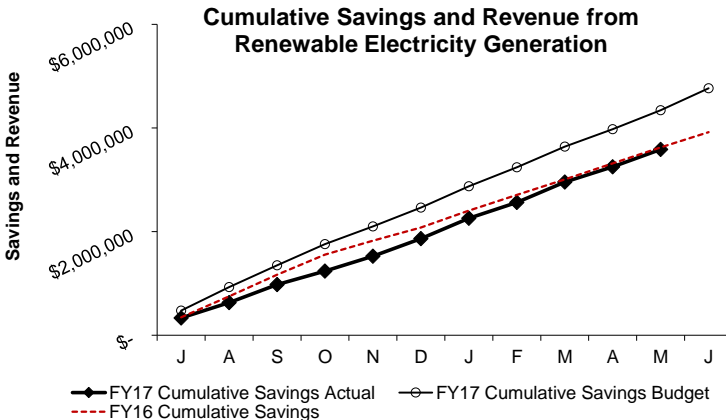
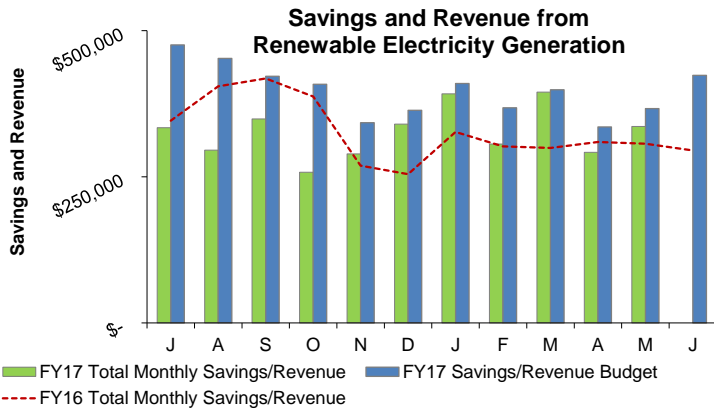


In FY17, MWRA's electricity generation by renewable resources totaled 54,309 MWh. MWRA's total electricity usage was approximately 188,501 MWh. The MWRA total electricity usage is the sum of all electricity purchased for Deer Island and FOD plus electricity produced and used on-site at these facilities. Approximately 99% of FOD electrical accounts are accounted for by actual billing statements; minor accounts that are not tracked on a monthly basis such as meters and cathodic protection systems are estimated based on this year's budget. In FY17, green power generation represented approximately 29% of total electricity usage. All renewable electricity generated on DI is used on-site (this accounts for more than 50% of MWRA renewable generation). Almost all renewable electricity generated off-DI is exported to the grid.

- Notes:
1. Only the actual energy prices are being reported. Therefore, some of the data lags up to 3 months due to timing of invoice receipt.
 2. Savings and Revenue: Savings refers to any/all renewable energy produced that is used on-site therefore saving the cost of purchasing that electricity, and revenue refers to any value of renewable energy produced that is sold to the grid.
 3. Budget values are based on historical averages for each facility and include operational impacts due to maintenance work.

Renewable Electricity Generation: Savings and Revenue

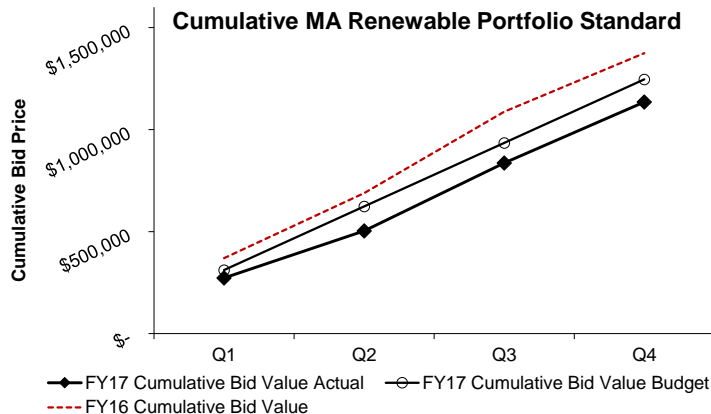
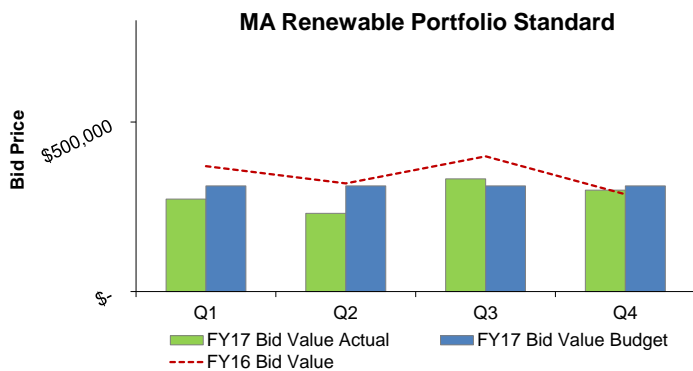
4th Quarter - FY17



Savings and revenue from MWRA renewable electricity generation in the first 11 months of FY17 (actuals through May¹) is \$3,585,862; which is 17% below the budget³, partly due to the fact that the actual electricity unit price for Deer Island has been 9% below the budgeted² estimate for the same period. Also due to DI STGs performing 40% below budget in October due to annual maintenance work on both STGs and the entire Thermal Power Plant.

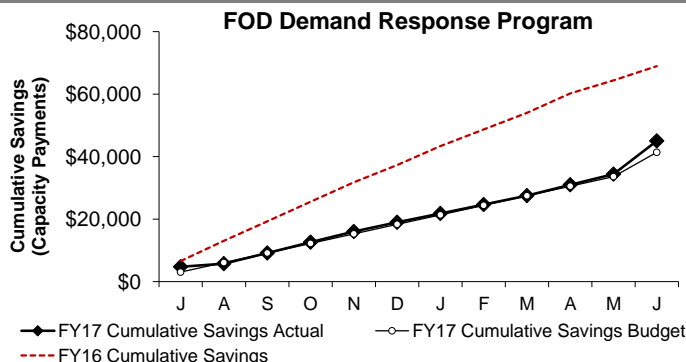
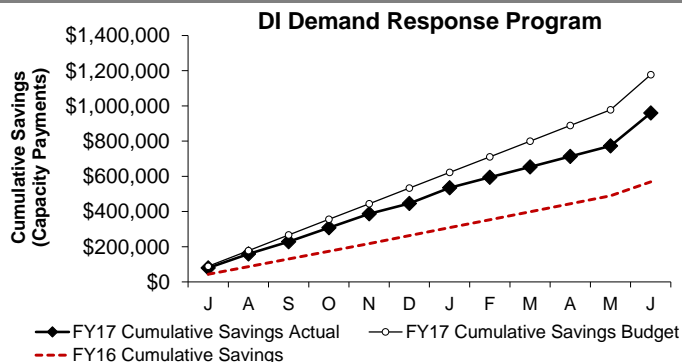
Savings and revenue² from all renewable energy sources include wind turbines, hydroelectric generators, solar panels, and steam turbines (DI). This includes savings and revenue due to electricity generation (does not include avoided fuel costs and RPS RECs).

The use of DITP digester gas as a fuel source provides the benefit of both electricity generation from the steam turbine generators, and provides thermal value for heating the plant, equivalent to approximately 5 million gallons of fuel oil per year (not included in charts above).



Bids were awarded during the 4th Quarter¹ from MWRA's renewable energy assets; 5,809 Q4 CY2016 Class I Renewable Energy Certificates (RECs), 4,411 Q4 CY2016 Class II RECs, and 43 Q4 CY2016 Solar RECs were sold for a total value of \$299,100 RPS revenue; which is 4% below budget³ for the Quarter. REC values reflect the bid value on the date that bids are accepted, even though the RECs were produced during Q4 of CY2016. Cumulative bid values reflects the total value of bids received to date.

Note: Only Class I and Solar RECs were sold for Q1 CY2016 sales. All of the available Q1 CY2016 Class II RECS were transferred to the electricity supplier (Direct Energy) to meet MWRA's obligation to them.



Currently Deer Island, JCWTP, and Loring Rd participate in the ISO-New England Demand Response Programs⁴. By agreeing to reduce demand and operate the facility generators to help reduce the ISO New England grid demand during periods of high energy demand, MWRA receives monthly Capacity Payments from ISO-NE. When MWRA operates the generators during an ISO-NE called event, MWRA also receives energy payments from ISO-NE.

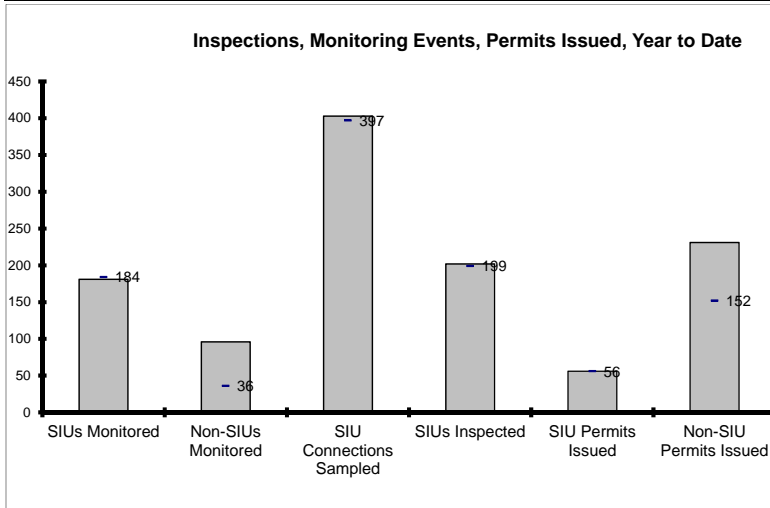
FY17 Cumulative savings (Capacity Payments only) through June¹ total \$959,726 for Deer Island and \$45,020 for FOD. Demand response payments are based on avoided electricity demand as measured during two audits per year. Higher electrical demand on the day of the audit will result in higher demand response payments. In FY17 the audits measured less electrical demand than anticipated in the budget, so payments were less than anticipated.

Notes:

1. Only the actual energy prices are being reported. Therefore, some of the data lags up to 3 months due to timing of invoice receipt.
2. Savings and Revenue: Savings refers to any/all renewable energy produced that is used on-site therefore saving the cost of purchasing that electricity, and revenue refers to any value of renewable energy produced that is sold to the grid.
3. Budget values are based on historical averages for each facility and include operational impacts due to maintenance work.
4. Chelsea Creek, Columbus Park, Ward St., and Nut Island participated in the ISO Demand Response Program through May 2016, until an emissions related EPA regulatory change resulted in the disqualification of these emergency generators, beginning June 2016. MWRA is investigating the cost-benefit of emissions upgrades for future possible participation.

Toxic Reduction and Control

4th Quarter - FY17



EPA Required SIU Monitoring Events
for FY17: 184
YTD : **181**

Required Non-SIU Monitoring Events
for FY17: 36
YTD : **96**

SIU Connections to be Sampled
For FY17: 397
YTD: **403**

EPA Required SIU Inspections
for FY17: 199
YTD: **202**

SIU Permits due to Expire
In FY17: 56
YTD: **56**

Significant Industrial Users (SIUs) are MWRA's highest priority industries due to their flow, type of industry, and/or their potential to violate limits. SIUs are defined by EPA and require a greater amount of oversight. EPA requires that all SIUs *with flow* be monitored at least once during the fiscal year. The "SIU Monitored" data above, reflects the number of industries monitored in the month. However, many of these industries have more than one sampling point and the "SIU Connections Sampled" data reflect samples taken from multiple sampling locations at these industries.

EPA requires MWRA to issue or renew 90% of SIU permits within 120 days of receipt of the application or the permit expiration date - whichever is later. EPA also requires the remaining 10% of SIU permits to be issued within 180 days. For this fiscal year.

	Number of Days to Issue a Permit						Total Permits Issued	
	0 to 120		121 to 180		181 or more		SIU	Non-SIU
	SIU	Non-SIU	SIU	Non-SIU	SIU	Non-SIU		
Jul	0	23	0	0	0	0	0	23
Aug	4	14	0	1	0	0	4	15
Sep	2	15	0	1	1	1	3	17
Oct	0	9	0	1	0	0	0	10
Nov	2	9	0	2	0	1	2	12
Dec	6	17	0	1	0	1	6	19
Jan	3	17	0	4	0	0	3	21
Feb	6	16	0	2	1	1	7	19
Mar	11	18	0	2	0	0	11	20
Apr	8	26	0	3	0	3	8	32
May	6	15	0	4	0	1	6	20
Jun	6	21	0	1	0	1	6	23
% YTD	96%	87%	0%	10%	4%	4%	56	231

In the 4th Quarter of FY17, ninety-five permits were issued, twenty of which were SIUs. The SIU permits were all issued within 120 days. There were thirteen non-SIU permits issued beyond the 120-day timeframe with five of them beyond the 180-day timeframe.

Overall for FY17, 96% of all SIU permits issued (54 of 56), met the 120-day requirement. However the two remaining SIU permits were issued beyond the 180-day timeframe - one had late-payment of fees problems and the other was delayed during the permit category determination phase.

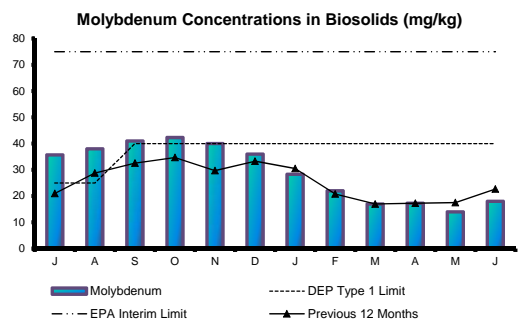
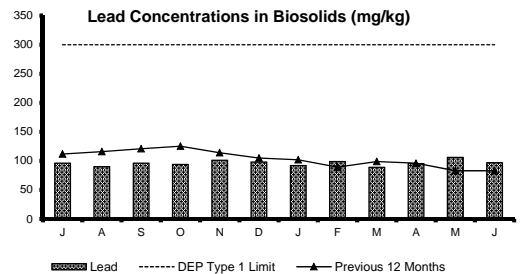
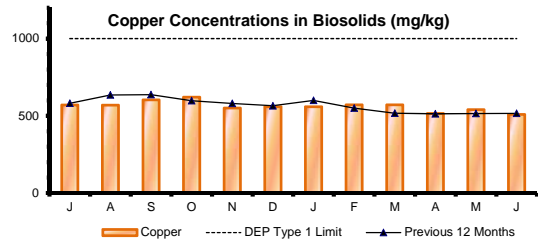
The new Clinton NPDES permit effective March 1, 2017, requires TRAC to issue/renew all industrial user control mechanisms within 90 days of their expiration date or within 180 days after the industry has been determined to be an SIU. While three Clinton SIU permits were issued in this fiscal year, two of them were issued since March 1, and both complied with the 90-day timeframe.

Copper, lead, and molybdenum are metals of concern for MWRA as their concentrations in its biosolids have, at times, exceeded regulatory standards for unrestricted use as fertilizer. With the September 2016 change in the Mass DEP regulations, increasing the molybdenum limits to 40 mg/kg for land use application, the MWRA may more often be able to sell its pellets in-state whereas the previous limits forced several months' worth of pellets to be shipped out of state. This made it an impractical source of fertilizer for local Massachusetts farms.

In the last three months, the level of molybdenum has been hovering around the 2016 average for the April to June months. MWRA has met the DEP's requirement for the 4th quarter. MWRA exceeded the DEP's requirement for July, August, September and October of FY17. MWRA and its contractor, NEFCO, do not distribute product that does not meet the suitability standards.

TRAC's annual monitoring and inspection goals are set at the beginning of each fiscal year but they can fluctuate due to the actual number of SIUs. Monitoring of SIUs and Non SIUs is dynamic for several reasons including; newly permitted facilities, sample site changes within the year requiring a permit change, non-discharging industries, partial sample event is counted as an event although not enough sample was taken due to discharge rate, increased inspections has led to permit category changes requiring additional monitoring events. This accounts for the difference in the goal set for FY17 and the actual number of events monitored.

SIU and Non-SIU permits are issued with durations of two to five years, depending on the category of industry, varying the number of permits that expire in a given year. Permit issuance can be delayed for several reasons including; non-payment of fees, MWRA awaiting the company's submittal of sample results for final determination of SIU category, or MWRA enforcement action.



Field Operations Highlights

4th Quarter – FY17

Western Water Operations and Maintenance

- Carroll Water Treatment: Staff replaced the plug valve that connects the storage tank drain (mud) valve system to the dewatering chamber. Valve Maintenance and Machine Shop Staff made modifications to the spool piece to accommodate the new valve and leak tested the system after the work was completed. Treatment plant returned to full plant operation after completing the annual half plant shutdown and necessary work to accommodate the Wachusett Aqueduct Pump Station Project. Aqua Aerobic Systems (which acquired the original supplier of the Ozone Generators. Fuji Electric) was hired to service the four Ozone Generator Power Supply Units and did an external inspection of the Ozone Generators.
- Diving Operations: Staff supported underwater diving operations at multiple locations. Norumbega Covered Storage Tank was undergoing an internal inspection for material buildup as well as structural condition. Winsor Power Station Intake had divers replacing the traveling screens as well as cleaning the intake channel. Quabbin Shaft 12 had divers doing an internal inspection to support the design project to install a shutdown mechanism. All required support for Lock Out/Tag Out (LOTO), Valve Operations as well as coordination to mitigate impacts to the operating system.
- Oakdale Power Station: Staff utilized the shutdown in April when no water was being transferred from the Quabbin Reservoir to perform electrical and mechanical projects. The main power generation transformer was replaced, the old transformer removed from the site, and the transformer pad modified. Mechanical repairs were also made to the lower guide bearing for the turbine. This bearing is monitored by a Vibration Based Predictive Maintenance Program, which indicated a slightly elevated vibration. During the shutdown, the guide bearing was removed and inspected, the Babbitt and Housing repaired and the turbine was placed into service in June to meet demand and establish the interflow conditions in the Wachusett Reservoir.

Metro Water Operations and Maintenance

- Water Pipeline Program: Work on the Deer Island Rip Rap Project that began in the 3rd Quarter was completed, prior to Sail Boston on June 17th. A project to increase flow capacity at Meter 130 supplying Winchester was completed, including installation of 12" piping, valves, and a larger insert Venturi Tube to improve pressure. The emergency connections that had been opened were closed, and the Winchester system was returned to its normal configuration. On May 18, Washington, D.C. experienced a break in an 1860's cast iron water main, and were in need of repair parts. Paul Burrige, Senior Program Manager drove four 30" repair couplings to Washington that day, arriving before 9pm. DC Water was able to make the repair due to MWRA's delivery of the repair couplings. A Leak Detection Survey was performed on 27.8 miles of MWRA water main, and community assistance was provided to Arlington, Boston, Brookline, Canton, DCR-Clinton, Lynn, Malden, Medford, Newton, Revere, Somerville and Wakefield. Community assistance was provided to Medford, Swampscott and Winthrop with community-owned Pressure Reducing Valves (PRVs). Winthrop had experienced a water main break due to its PRV malfunctioning, and Swampscott's tank was approaching its overflow level due to its malfunctioning PRV. Assistance was provided to Malden to rebuild their Meter 204 PRV and to Swampscott to adjust the operating range of their Meter 115 PRV. Assistance was provided to Winthrop late in June as the town dealt with another water main break. A 6" pump was deployed to assist with trench dewatering. The normally closed PRV on Section 108 in Norwood was flushed and placed into service to allow the Town of Norwood to perform valve and piping work in their distribution system. The work being done by Norwood requires that Meter 163 to the town be isolated and out of service for the duration of the project.
- Commonwealth Avenue Pump Station SCADA Upgrade: The control system in the Comm Ave Pump Station dates back to the construction of the west building in 2000, and is outdated. In early April, the Programmable Logic Controller (PLC) in the west building was replaced, with the east building remained in operation. The PLC and control system were successfully replaced, and an updated SCADA screen created for operation and control of the pump station from the Operations Control Center (OCC) in Chelsea.

Operations Engineering

Norumbega Tank Inspection: The tank inspection began on April 24th. A crack showing signs of infiltration in the roof of Cell 2 was discovered and thus needed to be repaired immediately. The inspection was suspended and a waterproofing contractor was hired to repair the roof from above. Cracking was also discovered along the walls and ceiling of the effluent channel, but no signs of infiltration. This will be evaluated when the full report is received and reviewed. The inspection was completed and the tank was placed in normal operation June 9th. While the covers over the hatches were removed for the inspection, the hatch alarms were updated.

Commercial Point CSO Chemical Building Demolition: Staff are obtaining the necessary permits required to demolish this building.

EAP for City, City Extension and the Dorchester Tunnels: Operations Engineering and Planning are currently, developing operation plans for the reconfiguration of the system during a tunnel isolation. A training course for MWRA Personnel is also being developed, with training to begin in late September or early October. The SOPs for the isolation for the tunnel system are also being finalized.

Wastewater Operations & Maintenance -- Wastewater Operations

- Alewife Brook Pump Station Rehabilitation-Contract #6797: Operations Staff is working with Construction Staff and the Contractor for this project. The contractor continued testing the bypass pumping system in April. Operations Staff attended the monthly Project Coordination Meeting onsite at the facility and several Bypass Pumping Meetings, and several internal coordination meetings in May. Bypass pumping documentation for this project was reviewed in June. Operations Staff also attended Mission Control (Bypass Pumping SCADA/Remote Monitoring System) Training.
- Back-Up Pump Control: Operations Staff attended meetings with Process Control and SCADA Staff to review and revise back-up pump control test procedures. The new procedures will be utilized to test back-up pump controls and ensure proper operation.

Metro Equipment and Facility Maintenance -- Equipment Maintenance Program

- Nut Island Load Bank: The Nut Island Emergency Generator load bank was becoming unreliable due to age and environment. A new load bank was purchased and installed by MWRA Electricians.

Field Operations Highlights

4th Quarter – FY17

- Chelsea Headworks: MWRA Plumbers conducted Grit Pipe Thickness Testing using non-invasive ultrasonic testing. Exhaust Fan Motor #1 experienced a bearing failure, and was replaced with a motor in stock. The failed motor will be rebuilt as a spare.
- Prison Point Dryweather Pump #1: The check valve failed, and a new valve was purchased and installed by MWRA Plumbers.

Metering

- Meter Systems: Staff continues to work with MIS to update the Telog Virtual Network and putting all the wireless meters on a private network. Staff prepared and presented the Staff Summary for the Wastewater Replacement Contract to the Board of Directors. Assisted Canton, Chelsea and Quincy on water loss issues. Worked with DCR on dam monitoring at Reservoir 2 in Framingham.

TRAC

- The New Clinton NPDES Permit became effective March 1, 2017. It requires MWRA to issue or renew all necessary Industrial User control mechanisms within 90 days of expiration or within 180 days after the industry has been determined to be a Significant Industrial User (SIU). During the 4th Quarter, TRAC issued two SIU Permits in Clinton, both within 90 days of receipt of the application.
- TRAC Staff conducted 171 Annual SIU Inspections, 1,255 other inspections and 178 Industrial Surveys. All the required Annual SIU Inspections for FY17 were complete by May 31, 2017. During the month of June, TRAC Staff conducted 52 spot inspections, 16 Industrial Surveys, and 29 other inspections.
- TRAC Staff monitored the septage receiving sites a total of 132 times. Staff conducted 6 septage hauler inspections necessary to renew and update a Septage Hauler Permit. Staff conducted 725 inspections of existing gasoline/oil separators, inspected 126 new construction gasoline/oil separators, and 8 MWRA Facility gasoline/oil separators.

Environmental Quality-Water

Algae

- From June 26th-30th, Staff provided on-site sampling and sonde profiling support at the Chestnut Hill Standby Reservoir in response to a Cyanobacteria Bloom.
- Staff continued with monitoring activity for nuisance taste and odor algae throughout June. Algae sampling increased as a result of elevated *Anabaena* Levels within Wachusett Reservoir. *Anabaena* Levels subsided and did not result in the need for an algaecide treatment.

Community Support

In coordination with MWRA Department of Laboratory Services (DLS) and the Massachusetts Department of Environmental Protection (DEP), Staff coordinated and facilitated six sessions of MWRA's biennial Drinking Water Sampler Program.

- On May 3rd, Staff provided equipment and training to DCR Staff involving sensor module replacement on several probes installed on the two EXO2 Monitoring Sondes belonging to DCR. Staff provided training on June 16th to seven DCR Staff on the calibration and deployment of Turner Sondes. Training included a review of Standard Operating Procedures (SOPs) for sonde calibration and field sampling and hands-on field sampling exercise at the Sudbury Reservoir using a Turner Sonde.

In-House Support

- Staff provided sampling support for the Norumbega Covered Storage Tank Inspection Project throughout May and June. During the offline tank cell period, sediment and water samples were collected and transferred for testing. Results showed that the water was suitable for cell reactivation. Additionally, Staff monitored chlorine residuals throughout the duration of the project using the Contaminant Monitoring System (CMS) and weekly grabs' sample checks.
- In June, Staff began quarterly monitoring at Sudbury Standby Reservoir. Samples were collected for various water quality parameters including: UV254, dissolved oxygen, specific conductance, pH, nutrients, nitrate, total organic carbon and algal toxins. Staff performed a full-depth sonde profile and collected samples from epilimnion through hypolimnion.

Buoy

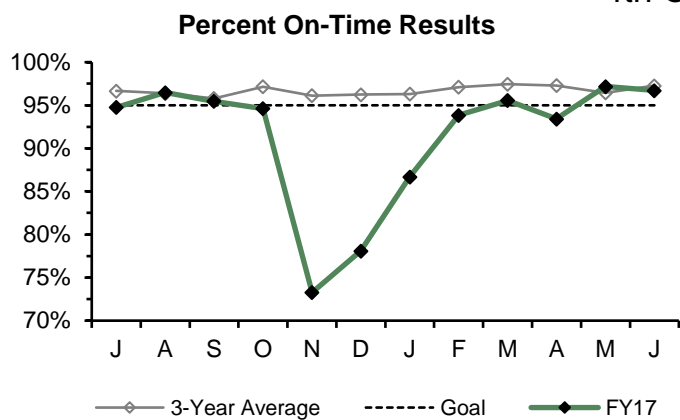
- On May 12th, Staff completed deployment of Buoys 2, 3 and 4. All three buoys have EXO2 and Turner Sonde Equipment currently collecting data from the Wachusett Reservoir. A new Gull/Cormorant Deterrent Device was installed on Buoy 4 to prevent gulls and cormorants from dropping fecal matter on buoy equipment, and being evaluated for its effectiveness at deterring the birds.
- Contaminant Monitoring System: Staff responded to two CMS alarm incidents in April, four in May and seven in June. Normal response protocols were followed in each incident.

Environmental Quality—Wastewater

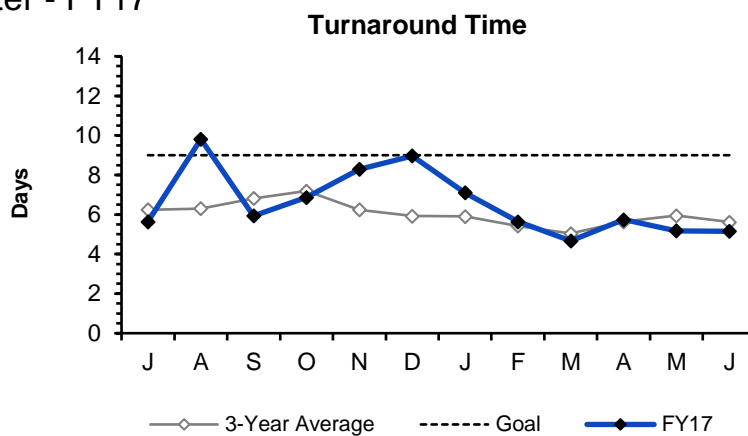
- Ambient Monitoring: Analysis and interpretation of results from 2016 monitoring occurred this quarter, as did numerous field surveys.
- Harbor/Beach/CSO Monitoring: Harborwide monitoring continues. CSO receiving water monitoring also continues with daily sampling rotating between subareas in support of the water quality standards variance. In 2017, limited weekend sampling after rainstorms has been added to the program to fully characterize return to baseline, and DLS staff were able to sample an extended period after a few storms including early April and over Memorial Day weekend. DCR beach sampling began on a weekly basis on May 25, daily after June 19; results are being posted to MWRA.com as they are received.
- Cooperation with Other agencies: ENQUAL Staff attended a Metropolitan Beaches Commission Meeting in Lynn on Kings Beach' issues on May 30th. Several ENQUAL Staff attended the Boston Harbor & Islands Symposium sponsored by the National Park Service and Massachusetts Bays Program in April and MWRA Staff gave three oral presentations and prepared three posters.

Laboratory Services

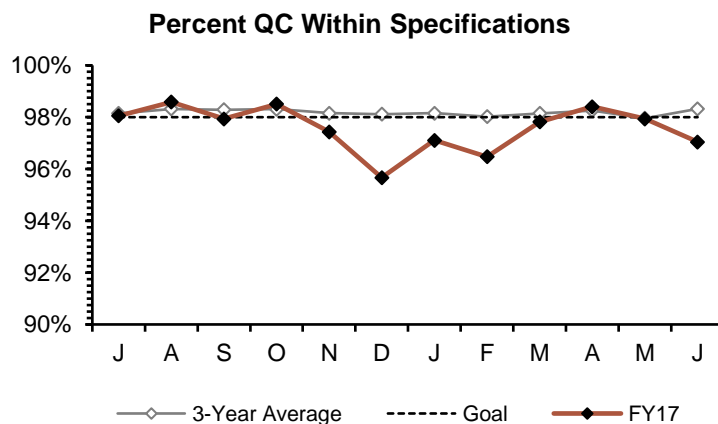
4th Quarter - FY17



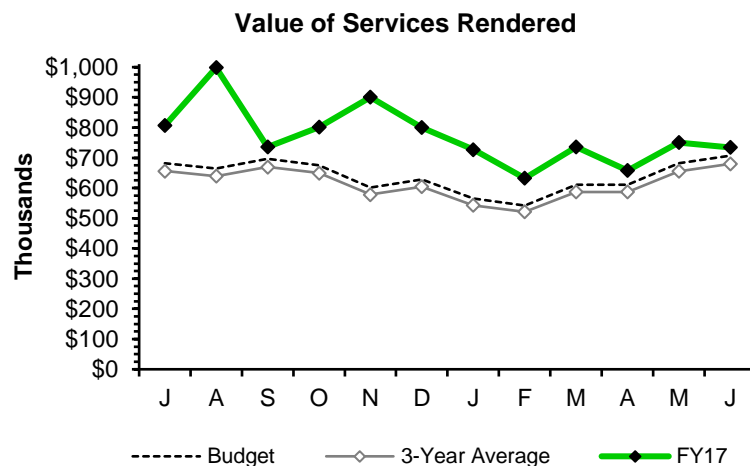
The Percent On-Time measurement was above the 95% goal 2 out of 3 months for the quarter. All regulatory reporting deadlines were met.



Turnaround Time was faster than the 9-day goal for the 3 months of the quarter.



Percent of QC tests meeting specifications was slightly below the 98% in-house goal for 2 months of the quarter. While this didn't affect regulatory reporting, it did require some re-work to obtain acceptable QC.



Value of Services Rendered was above the seasonally adjusted budget projection for three months of the quarter.

Highlights:

S. Rhode was re-appointed to a second three-year term on the Association of Public Health Laboratories' Environmental Lab Sciences Committee.

Harmful Algal Blooms:

S. Rhode was one of five contributors to a new APHL publication, "A Freshwater Algal Toxin Guidance Document for Public Health Laboratories". Harmful algal blooms can be a problem in every region of the country.

Cyanide:

A peer-reviewed paper, "Free Cyanide Forms During Drinking Water Free Cyanide Determination" by M. Delaney and C. Blodgett has been accepted for publication in the Journal of the American Water Works Association.

Quality Assurance:

The Southboro Lab successfully participated in a DEP certification audit, with perfect results. We passed all 29 annual drinking water microbiology Proficiency Test samples on the first try. These are required to maintain DEP certification.

DITP:

We successfully participated in an audit by DEP on DITP's air permit. We are unaware of any adverse findings.

Clinton:

DEP conducted an on-site audit for chemistry certification at the Clinton Laboratory. We are working on addressing the small number of minor findings. The microbiology DEP audit will be in August.

Drinking Water:

MWRA's participation on EPA's Environmental Laboratory Advisory Board has resulted in a letter to EPA advising them of several ways to improve drinking water testing for cyanide to avoid getting false positive results.

CSO Assessment:

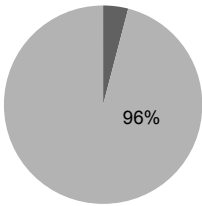
We continued to perform weekend CSO receiving water sampling in the Charles and Mystic Rivers during/after significant wet weather events. This is intended to give additional data for the CSO Assessment to document the recovery of the rivers after it rains.

CONSTRUCTION PROGRAMS

Projects In Construction

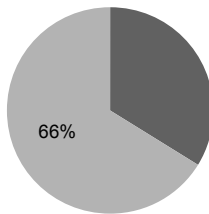
4th Quarter - FY17

Money



■ Amount Remaining
■ Billed to Date

Time



■ Days Remaining
■ Days Expended

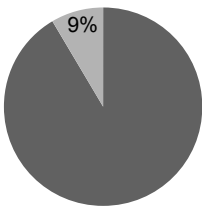
NIH Section 110 Reading & Woburn

Project Summary: This project involves the construction of 8,800 linear feet of 36-inch water transmission main in the City of Woburn and the Town of Reading.

Notice to Proceed: 12-Jan-2016 *Contract Completion:* 30-Mar-2018

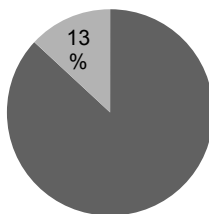
Status and Issues: As of June, the Contractor began final paving preparation and associated work such as resetting granite curbing, sidewalk construction, driveway apron construction, ramp construction and removal of structure castings.

Money



■ Amount Remaining
■ Billed to Date

Time



■ Days Remaining
■ Days Expended

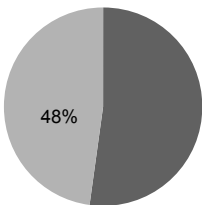
Chelsea Creek Headworks Upgrade

Project Summary: This project involves a major upgrade to the entire facility including: automation of screening collection & solids conveyance, replacement of the odor control, HVAC and electrical systems.

Notice to Proceed: 22-Nov-2016 *Contract Completion:* 21-Nov-2020

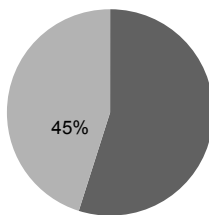
Status and Issues: As of June, Channel 1 abatement was completed and the channel was returned to service, after which the abatement of Channel 2 began. The HVAC contractor continued with the removal of ductwork on the operating levels prior to abatement activities.

Money



■ Amount Remaining
■ Billed to Date

Time



■ Days Remaining
■ Days Expended

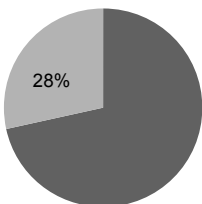
Wachusett Aqueduct Pumping Station

Project Summary: This project involves the construction of a 240 MGD pump station to supply water from the Wachusett Aqueduct to the Carroll Water Treatment Plant.

Notice to Proceed: 1-Mar-2016 *Contract Completion:* 14-Feb-2019

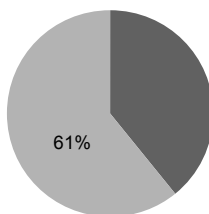
Status and Issues: As of June, the Contractor worked on the following: began plumbing installation, installed bridge crane, installed structural steel and continued work on the south wall of the Pipe Gallery. They also, continued with the slide/weir gates, installed wet well access hatches and 36" pumps #1 through #6.

Money



■ Amount Remaining
■ Billed to Date

Time



■ Days Remaining
■ Days Expended

Alewife Brook Pump Station Improvements

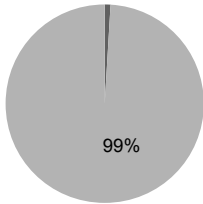
Project Summary: This project involves the replacement of wet-weather pumps, motors, gear drives, VFD's, MCC, screens, sluice gates, standby generator, roof, PLC's and HVAC. Also, the remediation of PCB's and asbestos and the installation of a flow meter on the 66-inch downstream Alewife Brook Conduit.

Notice to Proceed: 29-Jan-2016 *Contract Completion:* 31-May-2018

Status and Issues: As of June, the Contractor set up and performed air monitoring for PCB Abatement in the pump room and performed PCB abatement verification sampling. In addition, they completed forming boiler concrete pad and installed reinforcing.

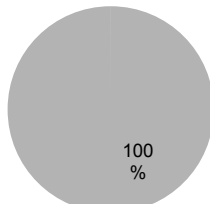
Projects In Construction 4th Quarter - FY17

Money



■ Amount Remaining
■ Billed to Date

Time



■ Days Remaining
■ Days Expended

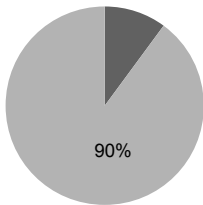
Caruso Pump Station Improvements

Project Summary: This project involves the replacement of the stand-by emergency generator and improvements to the HVAC, fire suppression and security systems at the Caruso Pump Station.

Notice to Proceed: 24-Mar-2016 **Contract Completion:** 3-May-2017

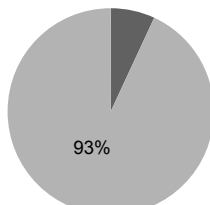
Status and Issues: Substantial completion was established on June 9th and a monetized punch list has been submitted to the Contractor.

Money



■ Amount Remaining
■ Billed to Date

Time



■ Days Remaining
■ Days Expended

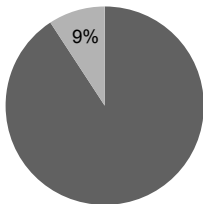
DITP Valves and Piping Replacements

Project Summary: This project involves the replacement of the twenty 60" butterfly valves and ten 60" flow meters in the NMPS; three 48", twelve 36" plug/check valves, six 30" flow meters and six 30-36" gate valves in the WTF.

Notice to Proceed: 23-Jun-2014 **Contract Completion:** 22-Jun-2017

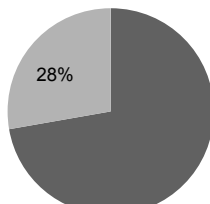
Status and Issues: As of June, Contractor completed the replacement of two Butterfly Valves and one flow meter on Train #7 and commenced the replacement of the valves on Train #10 and installed new linkage pins and the dashpot for the check valve on Train #1.

Money



■ Amount Remaining
■ Billed to Date

Time



■ Days Remaining
■ Days Expended

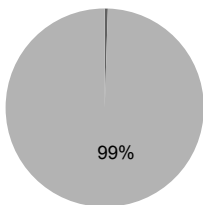
Winthrop Terminal VFD and Motor

Project Summary: This project involves the replacement of 6, 600-HP motors, VFDs and associated electrical components in the Winthrop Terminal Facility.

Notice to Proceed: 16-Jun-2016 **Contract Completion:** 12-Mar-2020

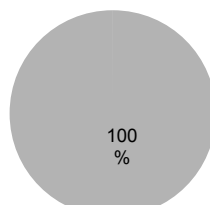
Status and Issues: The Contractor, JFW submitted major equipment submittals. The first transformer to be testing during September and the first VFD/Motor shop test will be in November.

Money



■ Amount Remaining
■ Billed to Date

Time



■ Days Remaining
■ Days Expended

DITP Replacement of Scum Skimmers

Project Summary: This project involves the replacement of the existing carbon steel tip tubes with 316 stainless steel in 48 primary and 54 secondary clarifiers to improve reliability and increase longevity.

Notice to Proceed: 9-Oct-2013 **Contract Completion:** 10-Oct-2016

Status and Issues: The punchlist work is on-going. The Contractor has submitted the necessary documentation required for a Partial Release of Retainage.

CSO CONTROL PROGRAM

4th Quarter – FY17

All 35 projects in the Long-Term CSO Control Plan are complete, in compliance with Schedule Seven. The FY18 CIP includes approximately \$8.4 million in remaining CSO related capital spending through 2021. Remaining work includes Cambridge’s completion of surface restoration associated with the Alewife/CAM004 sewer separation contracts (\$1.3 million), BWSC’s removal of additional inflow from its Dorchester Interceptor system in the South Dorchester Bay sewer separation areas (\$3.8 million), the federal court mandated three-year CSO post-construction monitoring and performance assessment, 2018-2020 (\$3.0 million) and as-needed technical or regulatory support (\$0.3 million).

Project/Item	Status as of June 30, 2017
BWSC Memorandum of Understanding and Financial Assistance Agreement (MOU/FAA)	MWRA staff have completed final eligibility reviews – and MWRA and BWSC have executed final eligibility certifications – for the BWSC construction and ESDC contracts funded through the MOU/FAA since inception in 1996. The MOU/FAA ended on June 30, 2017. Remaining BWSC CSO related work eligible for MWRA funding is limited to the removal of additional stormwater inflow from the BWSC Dorchester Interceptor system. This work has been removed from the MOU/FAA and instead will be funded under a new, separate agreement (see related item, below).
Dorchester Interceptor Inflow Removal	MWRA’s CIP and the MOU/FAA with BWSC has for many years included \$5.4 million for additional inflow removal from the BWSC Dorchester Interceptor system in the South Dorchester Bay Sewer Separation area, of which \$1.7 million was transferred to the BWSC MOU/FAA CSO account and \$1.6 million of that was withdrawn by BWSC to fund related design and construction work. On May 17, 2017, the MWRA Board of Directors authorized removing the remaining \$3.8 million from the BWSC MOU/FAA and instead including this funding amount in a separate, 4-year financial assistance agreement with BWSC effective July 1, 2017.
City of Cambridge Memorandum of Understanding and Financial Assistance Agreement	The City of Cambridge attained substantial completion of its last project, CAM004 Sewer Separation, in December 2015 in compliance with Schedule Seven. Extensive surface restoration work eligible for MWRA funding at a remaining award amount of \$1.3 million is scheduled to continue through December 2017, followed by six months of final eligibility review and close-out of the Cambridge construction contracts and close-out of the MOU/FAA in June 2018.
MWRA CSO Performance Assessment	The federal court schedule requires MWRA to commence a 3-year assessment of CSO performance by January 2018. MWRA submitted the Scope of Work for the CSO Post-Construction Monitoring Program and Performance Assessment to DEP on May 1, 2017, in compliance with a condition in the Charles River and Alewife Brook/Upper Mystic River CSO variances. DEP noticed the Scope of Work in the Massachusetts Environmental Monitor for a 30-day public comment period that closed on June 22. On July 1, MWRA advertised the RFQ/P for a professional services contract that will provide flow metering, hydraulic modeling, water quality evaluations and system performance assessments.

CIP Expenditures 4th Quarter FY17

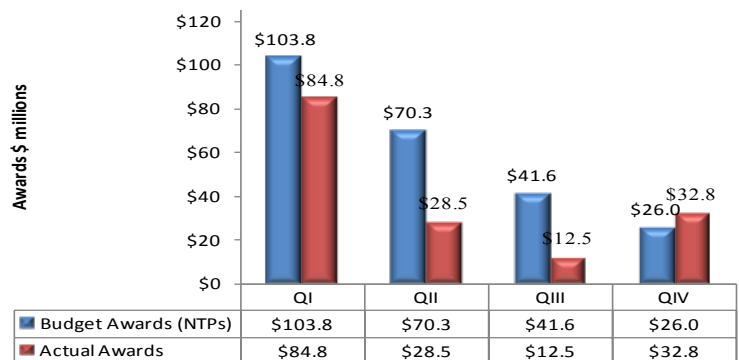
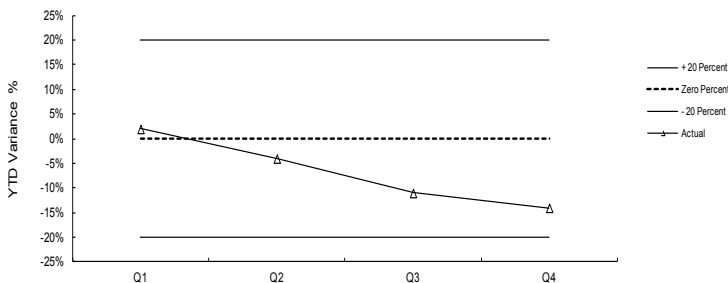
FY17 Capital Improvement Program Expenditure Variances through June by Program - (\$ in thousands)				
Program	FY17 Budget Through June	FY17 Actual Through June	Variance Amount	Variance Percent
Wastewater	70,374	64,803	(5,571)	-8%
Waterworks	73,009	63,311	(9,698)	-13%
Business and Operations Support	11,943	5,075	(6,868)	-58%
Total	\$155,326	\$133,189	(\$22,137)	-14%

Project underspending within Wastewater was due to fewer than anticipated community requests for loans and grants, delay in the award of the Chelsea Headworks Upgrade Construction, schedule changes for the Clinton Roof Rehabilitation and Deer Island Gravity Thickener contracts, partially offset by payment of a legal settlement for Primary/Secondary Clarifier Rehabilitation at Deer Island, construction progress on the North Main Pump Station and Winthrop Terminal Facility Butterfly Valve Replacements, Deer Island Power System Improvements, Clinton Phosphorus Reduction, Digester Sludge Pump Replacement Phase 2, timing of payment for final work on the Chelsea Screenhouse and Deer Island Electrical Upgrades contracts, and updated final cost estimates for the Cambridge Sewer Separation contracts. Project underspending in Waterworks was due to schedule changes for NIH Section 89/29 Redundancy Phase 1C and Phase 2 Construction, SEH Section 111 Construction contracts, Marlborough Maintenance Facility, and Chestnut Hill Gatehouse No. 1 Repairs, reduced scope for Sudbury Aqueduct MEPA Review, timing of Watershed Land purchases, less than anticipated progress for Rosemary Brook Siphon Building Repairs, partially offset by greater than anticipated community requests for loans, contractor progress on NIH Section 89/29 Redundancy Phase 1B, Wachusett Pump Station, Fish Hatchery Pipeline, and additional work for the Webster Avenue Bridge Pipe Replacement Construction.

Budget vs. Actual CIP Expenditures

(\$ in thousands)

Total FY17 CIP Budget of \$155,326,778



Construction Fund Management

All payments to support the capital program are made from the Construction Fund. Sources of fund in-flows include bond proceeds, commercial paper, SRF reimbursements, loan repayments by municipalities, and current revenue. Accurate estimates of cash withdrawals and grant payments (both of which are derived from CIP spending projections) facilitate planning for future borrowings and maintaining an appropriate construction fund balance.

Cash Balance as of 6/30/2017	\$117.2 million
Unused capacity under the debt cap:	\$1.236 billion
Estimated date for exhausting construction fund without new borrowing:	MAY-18
Estimated date for debt cap increase to support new borrowing:	Not anticipated at this time
Commercial paper/Revolving loan outstanding:	\$178 million
Commercial paper capacity:	\$ 350 million
Budgeted FY17 capital spending*:	\$136 million

* Cash based spending is discounted for construction retainage.

DRINKING WATER QUALITY AND SUPPLY

Source Water – Microbial Results and UV Absorbance

4th Quarter – FY17

Source Water – Microbial Results

Total coliform bacteria are monitored in both source and treated water to provide an indication of overall bacteriological activity. Most coliforms are harmless. However, fecal coliform, a subclass of the coliform group, are identified by their growth at temperatures comparable to those in the intestinal tract of mammals. They act as indicators of possible fecal contamination. The Surface Water Treatment Rule for unfiltered water supplies allows for no more than 10% of source water samples prior to disinfection over any six-month period to have more than 20 fecal coliforms per 100mL.

Sample Site: Quabbin Reservoir

Quabbin Reservoir water is sampled at the William A. Brutsch Water Treatment Facility (formerly Ware Disinfection Facility) raw water tap before being treated and entering the CVA system.

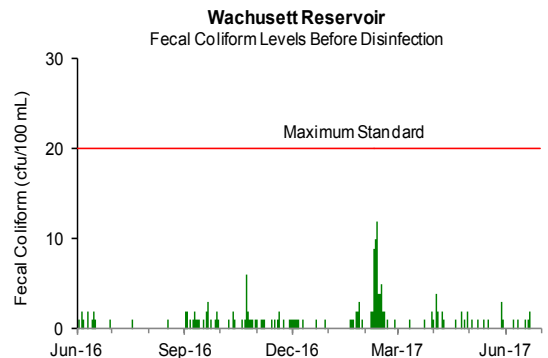
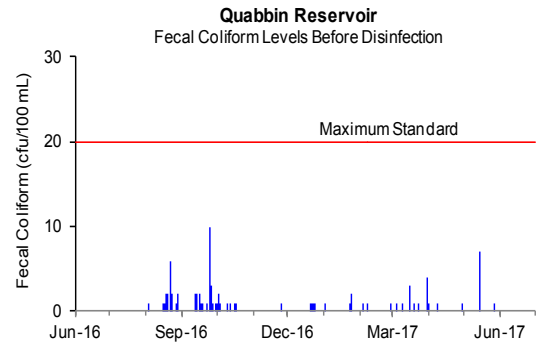
All samples collected during the 4th Quarter were below 20 cfu/100ml. **For the current six-month period, 0.0% of the samples have exceeded a count of 20 cfu/100mL, compared to the allowable 10%.**

Sample Site: Wachusett Reservoir

Wachusett Reservoir water is sampled at the CWTP raw water tap in Marlborough before being treated and entering the MetroWest/Metropolitan Boston systems.

In the wintertime when smaller water bodies near Wachusett Reservoir freeze up, many waterfowl will roost in the main body of the reservoir - which freezes later. This increased bird activity tends to increase fecal coliform counts. DCR has an active bird harassment program to move the birds away from the intake area.

All samples collected during the 4th Quarter were below 20 cfu/100ml. **For the current six-month period, 0.0% of the samples exceeded a count of 20 cfu/100mL.**

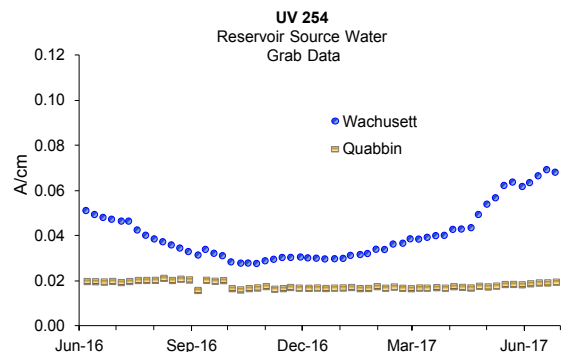


Source Water – UV Absorbance

UV Absorbance at 254nm wavelength (UV-254), is a measure of the amount and reactivity of natural organic material in source water. Higher UV-254 levels cause increased ozone and chlorine demand resulting in the need for higher ozone and chlorine doses, and can increase the level of disinfection by-products. UV-254 is impacted by tributary flows, water age, sunlight and other factors.

Quabbin Reservoir UV-254 levels are currently around 0.019 A/cm.

Wachusett Reservoir UV-254 levels are currently around 0.068 A/cm.



Source Water – Turbidity

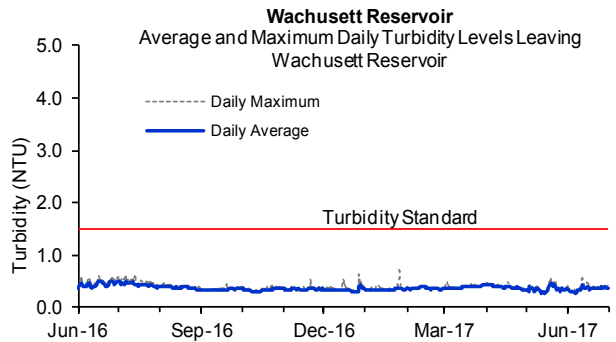
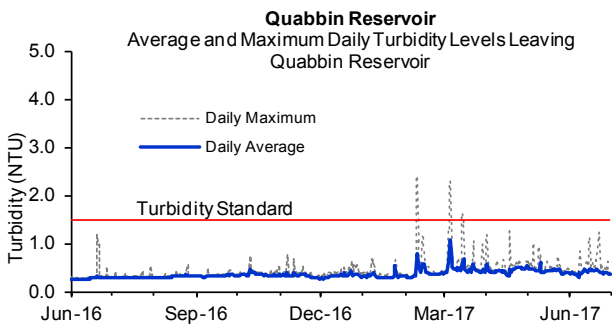
4th Quarter – FY17

Turbidity is a measure of suspended and colloidal particles including clay, silt, organic and inorganic matter, algae and microorganisms. The effects of turbidity depend on the nature of the matter that causes the turbidity. High levels of particulate matter may have a higher disinfectant demand or may protect bacteria from disinfection effects, thereby interfering with the disinfectant residual throughout the distribution system.

There are two standards for turbidity: all water must be below 5 NTU (Nephelometric Turbidity Units), and water only can be above 1 NTU if it does not interfere with effective disinfection.

Turbidity of Quabbin Reservoir water is monitored continuously at the Brutsch Water Treatment Facility (BWTF) before UV and chlorine disinfection. Turbidity of Wachusett Reservoir is monitored continuously at the Carroll Water Treatment Plant (CWTP) before ozonation and UV disinfection.

Maximum turbidity results at Wachusett were within DEP standards for the quarter. Maximum turbidity results at Quabbin were within DEP standards for January. High winds on February 9 and February 13 caused the turbidity at the BWTF intake to exceed 1 NTU on these days. High north winds on March 4 to 5 and March 14 to 15 caused the turbidity at the BWTF intake to exceed 1 NTU on these days. During these events disinfection effectiveness was not affected; CT was maintained at all times, downstream disinfectant residuals were maintained, and no coliform were detected in downstream samples.

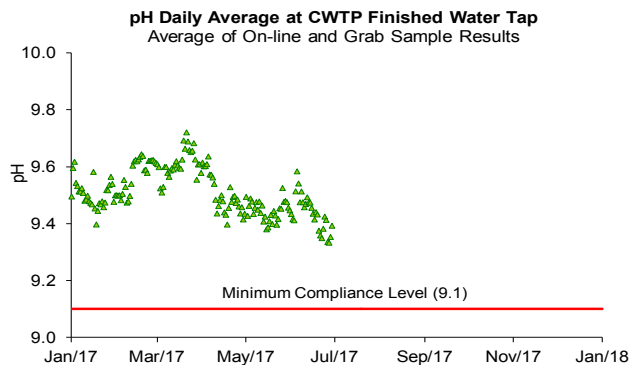
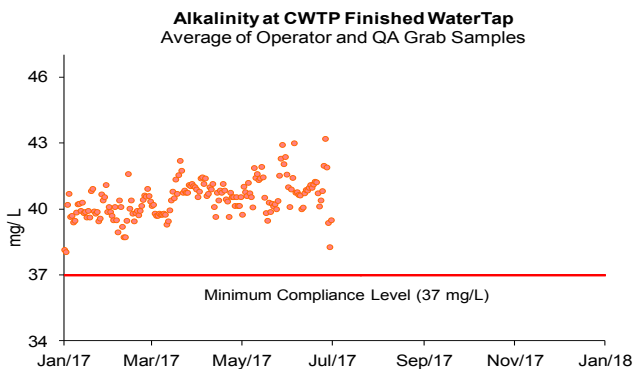


Treated Water – pH and Alkalinity Compliance

MWRA adjusts the alkalinity and pH of Wachusett water at CWTP to reduce its corrosivity, which minimizes the leaching of lead and copper from service lines and home plumbing systems into the water. MWRA tests finished water pH and alkalinity daily at the CWTP's Fin B sampling tap. MWRA's target for distribution system pH is 9.3; the target for alkalinity is 40 mg/l. Per DEP requirements, CWTP finished water samples have a minimum compliance level of 9.1 for pH and 37 mg/L for alkalinity. Samples from 27 distribution system locations have a minimum compliance level of 9.0 for pH and 37 mg/L for alkalinity. Results must not be below these levels for more than nine days in a six month period. Distribution system samples are collected in March, June, September, and December.

Each CVA community provides its own corrosion control treatment. See the CVA report: www.mwra.com/water/html/awqr.htm.

Distribution system samples were collected on June 7 and 8, 2017. Distribution system sample pH ranged from 9.5 to 9.6 and alkalinity ranged from 40 to 42 mg/L. No sample results were below DEP limits for this quarter.



Treated Water – Disinfection Effectiveness

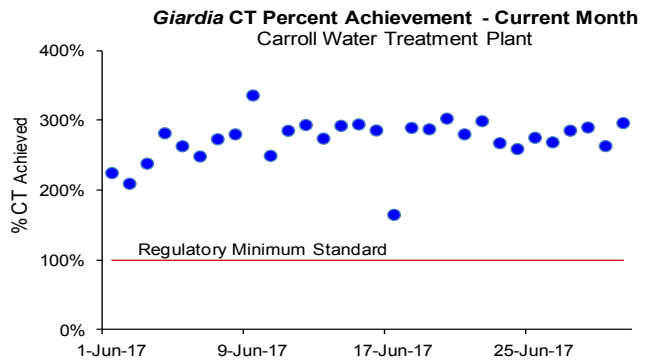
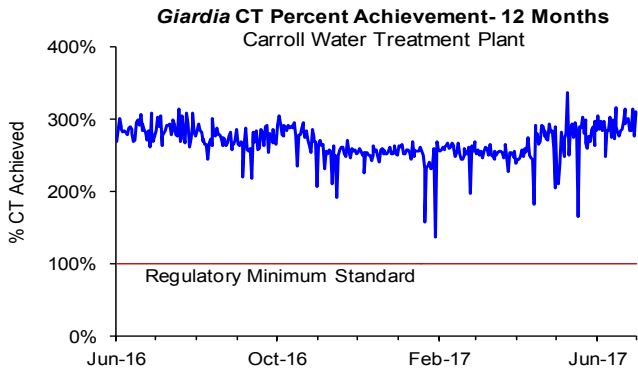
4th Quarter – FY17

At the Carroll Water Treatment Plant (CWTP), MWRA meets the required 99.9% (3-log) inactivation of *Giardia* using ozone (reported as CT: concentration of disinfectant x contact time) and the required 99% (2-log) inactivation of *Cryptosporidium* using UV (reported as IT: intensity of UV x time). MWRA calculates inactivation rates hourly and reports *Giardia* inactivation at maximum flow and *Cryptosporidium* inactivation at minimum UV dose. MWRA must meet 100% of required CT and IT.

CT achievement for *Giardia* assures CT achievement for viruses, which have a lower CT requirement. For *Cryptosporidium*, there is also an "off-spec" requirement. Off-spec water is water that has not reached the full required UV dose or if the UV reactor is operated outside its validated ranges. No more than 5% off-spec water is allowed in a month.

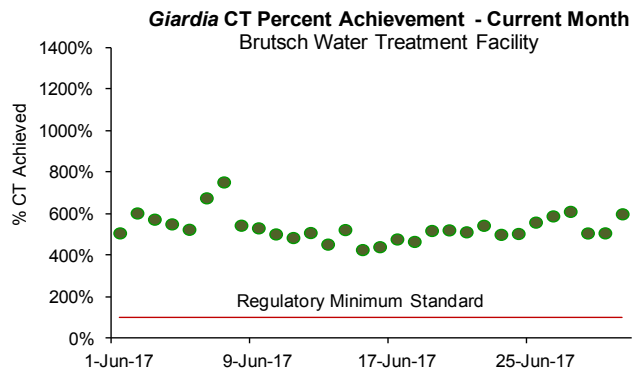
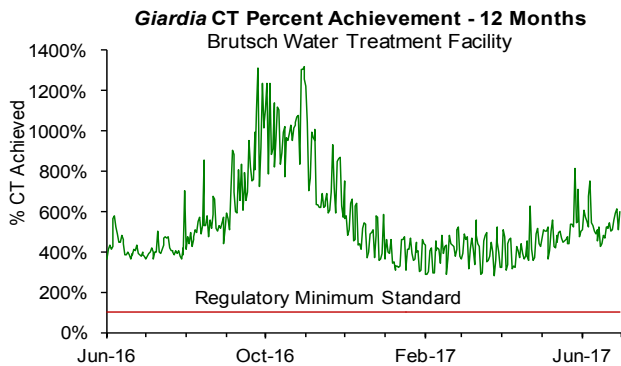
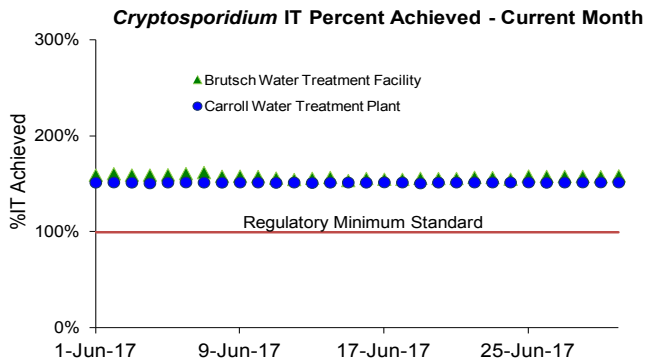
Wachusett Reservoir – MetroWest/Metro Boston Supply:

- Ozone dose at the CWTP varied between 1.4 to 2.5 mg/L for the quarter.
- Giardia* CT was maintained above 100% at all times the plant was providing water into the distribution system this quarter, as well as every day for the last fiscal year.
- Cryptosporidium* IT was maintained above 100% during the month. Off-spec water was less than 5%.



Quabbin Reservoir (CVA Supply) at: Brutsch Water Treatment Facility

- The chlorine dose at BWTF is adjusted in order to achieve MWRA's seasonal target of >0.75 mg/L (November 01 – May 31) and >1.0 mg/L (June 1– October 31) at Ludlow Monitoring Station.
- The chlorine dose at BWTF ranged from 1.3 to 1.7 mg/L for the quarter.
- Giardia* CT was maintained above 100% at all times the plant was providing water into the distribution system for the quarter.
- Cryptosporidium* IT was maintained above 100% during the month. Off-spec water was less than 5%.

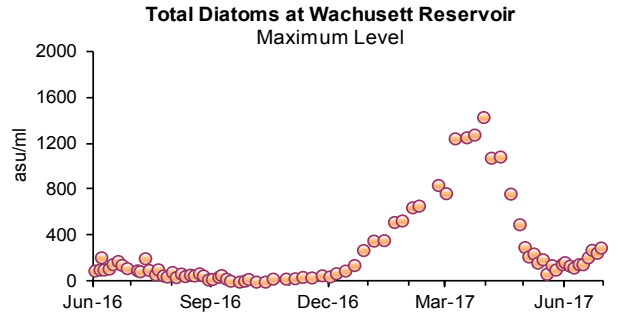
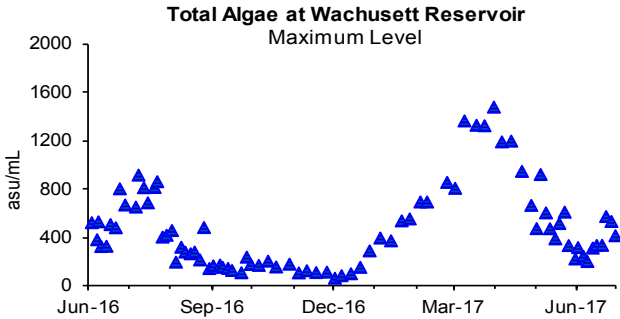


Source Water - Algae 4th Quarter – FY17

Algae levels in Wachusett Reservoir are monitored by DCR and MWRA. These results, along with taste and odor complaints, are used to make decisions on source water treatment for algae control.

Taste and odor complaints at the tap may be due to algae, which originate in source reservoirs, typically in trace amounts. Occasionally, a particular species grows rapidly, increasing its concentration in water. When *Synura*, *Anabaena*, or other nuisance algae bloom, MWRA may treat the reservoir with copper sulfate, an algaecide. During the winter and spring, diatom numbers may increase. While not a taste and odor concern, consumers that use filters may notice a more frequent need to change their filters.

In the 4th Quarter, seventeen complaints which may be related to algae were reported from the local water departments.

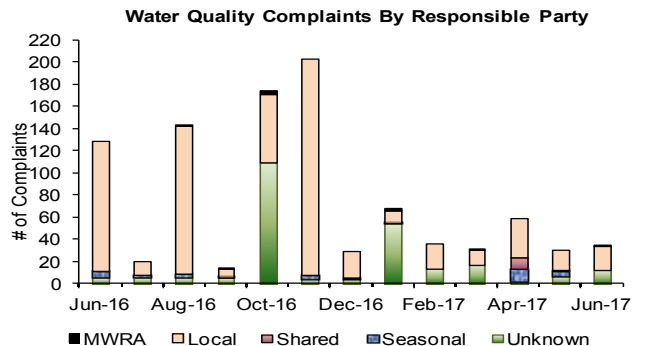
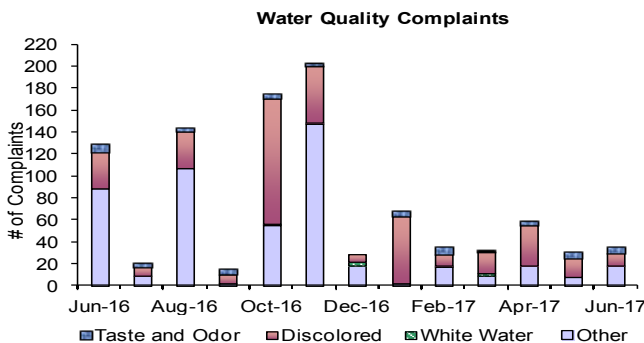


Drinking Water Quality Customer Complaints: Taste, Odor, or Appearance

MWRA collects information on water quality complaints that typically fall into four categories: 1.) discoloration due to MWRA or local pipeline work; 2.) taste and odor due to algae blooms in reservoirs or chlorine in the water; 3.) white water caused by changes in pressure or temperature that traps air bubbles in the water; or 4.) "other" complaints including no water, clogged filters or other issues.

MWRA routinely contacts communities to classify and tabulate water complaints from customers. This count, reflecting only telephone calls to towns, probably captures only a fraction of the total number of customer complaints. Field Operations staff have improved data collection and reporting by keeping track of more kinds of complaints, tracking complaints to street addresses and circulating results internally on a daily basis.

Communities reported 125 complaints during the quarter compared to 182 complaints from 4th Quarter of FY16. Of these complaints, 66 were for "discolored water", 15 were for "taste and odor", and 44 were for "other". Of these complaints, 77 were local community issues, 1 was MWRA related, 12 were community and MWRA shared issues, 15 were seasonal in nature, and 20 were unknown in origin. The complaints were scattered amongst the communities.



Bacteria & Chlorine Residual Results for Communities in MWRA Testing Program

4th Quarter – FY17

While all communities collect bacteria samples and chlorine residual data for the Total Coliform Rule (TCR), data from the 44 systems that use MWRA's Laboratory are reported below.

The MWRA TCR program has 141 sampling locations. These locations include sites along MWRA's transmission system, water storage tanks and pumping stations, as well as a subset of the community TCR locations.

The TCR requires that no more than 5% of all samples in a month may be total coliform positive (or that no more than one sample be positive when less than 40 samples are collected each month). Public notification is required if this standard is exceeded.

Escherichia coli (*E. coli*) is a specific coliform species whose presence likely indicates potential contamination of fecal origin. If *E. coli* are detected in a drinking water sample, this is considered evidence of a potential public health concern. Public notification is required if follow-up tests confirm the presence of *E. coli* or total coliform.

A disinfectant residual is intended to maintain the sanitary integrity of the water; MWRA considers a residual of 0.2 mg/L a minimum target level at all points in the distribution system.

Highlights

In the 4th Quarter, 10 of the 6,250 community samples submitted to MWRA labs for analysis tested positive for total coliform. Four of the 1,960 MWRA samples tested positive for total coliform. No sample tested positive for *E. coli*. Only 0.7% of the samples had a chlorine residual lower than 0.2 mg/L for the quarter.

		# Coliform Samples (a)	Total Coliform # (%) Positive	E.coli # Positive	Assessment Required ^e		Minimum Chlorine Residual (mg/L)	Average Chlorine Residual (mg/L)			
					Level 1 or 2	Violation ^f					
MWRA	d	MWRA Locations	369	1 (0.27%)	0			1.72	2.42		
		Shared Community/MWRA sites	1591	3 (0.19%)	0	Level 1 or 2		0.08	2.11		
		Total: MWRA	1960	4 (0.20%)	0			0.08	2.18		
Fully Served		ARLINGTON	169	0 (0%)	0			1.16	2.02		
		BELMONT	104	0 (0%)	0			1.20	2.02		
		BOSTON	780	0 (0%)	0			1.70	2.20		
		BROOKLINE	224	0 (0%)	0			1.09	2.10		
		CHELSEA	169	0 (0%)	0			1.46	2.24		
		DEER ISLAND	52	0 (0%)	0			1.32	2.09		
		EVERETT	168	0 (0%)	0			0.20	2.14		
		FRAMINGHAM	234	0 (0%)	0			0.44	2.11		
		LEXINGTON	116	0 (0%)	0			0.68	2.23		
		LYNNFIELD	18	0 (0%)	0			1.45	2.12		
		MALDEN	243	3 (1.23%)	0			0.30	2.01		
		MARBLEHEAD	72	0 (0%)	0			1.23	2.12		
		MEDFORD	221	0 (0%)	0			1.16	1.95		
		MELROSE	117	0 (0%)	0			0.75	2.05		
		MILTON	102	0 (0%)	0			0.57	1.96		
		NAHANT	30	0 (0%)	0			1.38	1.86		
		NEWTON	279	1 (0.36%)	0			0.08	2.03		
		NORTHBOROUGH	48	0 (0%)	0			1.67	2.21		
		NORWOOD	102	1 (0.98%)	0			1.20	2.18		
		QUINCY	299	0 (0%)	0			0.52	1.91		
		READING	130	0 (0%)	0			0.89	2.02		
		REVERE	180	0 (0%)	0			1.37	2.19		
		SAUGUS	104	0 (0%)	0			1.31	1.86		
		SOMERVILLE	273	0 (0%)	0			1.43	2.29		
		SOUTHBOROUGH	30	0 (0%)	0			0.59	2.03		
		STONEHAM	91	0 (0%)	0			1.88	2.25		
		SWAMPSCOTT	54	0 (0%)	0			1.71	2.12		
		WALTHAM	216	0 (0%)	0			1.59	2.18		
		WATERTOWN	133	1 (0.75%)	0			1.04	2.11		
		WESTBORO HOSPITAL	15	0 (0%)	0			0.06	0.59		
		WESTON	45	0 (0%)	0			1.92	2.44		
		WINTHROP	72	0 (0%)	0			0.21	1.95		
		Total: Fully Served	4890	6 (0.12%)	0						
	CVA & Partially Served		BEDFORD	57	0 (0%)	0			1.06	1.88	
			CANTON	87	0 (0%)	0			0.06	1.38	
			HANSCOM AFB	42	3 (7.14%)	0	Level 1	No	0.89	1.85	
			MARLBOROUGH	126	0 (0%)	0			1.88	2.42	
			NEEDHAM	123	0 (0%)	0			0.14	0.79	
			PEABODY	221	0 (0%)	0			1.02	2.03	
			WAKEFIELD	144	0 (0%)	0			0.89	1.74	
			WELLESLEY	114	0 (0%)	0			0.09	0.74	
			WILMINGTON	86	0 (0%)	0			0.57	1.94	
			WINCHESTER	91	0 (0%)	0			0.12	1.68	
			WOBURN	195	0 (0%)	0			0.12	0.96	
			SOUTH HADLEY FD1	74	1 (1.35%)	0			0.02	0.50	
			Total: CVA & Partially Served	1360	4 (0.29%)	0					
			Total: Community Samples	6250	10 (0.16%)	0					

(a) The number of samples collected depends on the population served and the number of repeat samples required.
 (b) These communities are partially supplied, and may mix their chlorinated supply with MWRA chloraminated supply.
 (c) Part of the Chicopee Valley Aqueduct System. Free chlorine system.
 (d) MWRA total coliform and chlorine residual results include data from 125 community pipe locations as described above. In most cases these community results are accurately indicative of MWRA water as it enters the community system; however, some are clearly strongly influenced by local pipe conditions. Residuals in the MWRA system are typically between 1.0 and 2.8 mg/L.
 (e) The TCR requires an assessment be completed if more than 5% of all samples in a month are total coliform positive (or two or more samples are positive when fewer than 40 samples are collected each month).
 (f) Some reasons a violation may occur: the required # of TCR samples is not collected; failure to report; an E.coli MCL violation; coliform treatment technique not followed properly; failure to conduct a level 1 or level 2 assessment within 30 days of trigger.

Treated Water Quality: Disinfection By-Product (DBP) Levels in Communities

4th Quarter – FY17

Total Trihalomethanes (TTHMs) and Haloacetic Acids (HAA5s) are by-products of disinfection treatment with chlorine. TTHMs and HAA5s are of concern due to their potential adverse health effects at high levels. EPA’s locational running annual average (LRAA) standard is 80 µg/L for TTHMs and 60 µg/L for HAA5s.

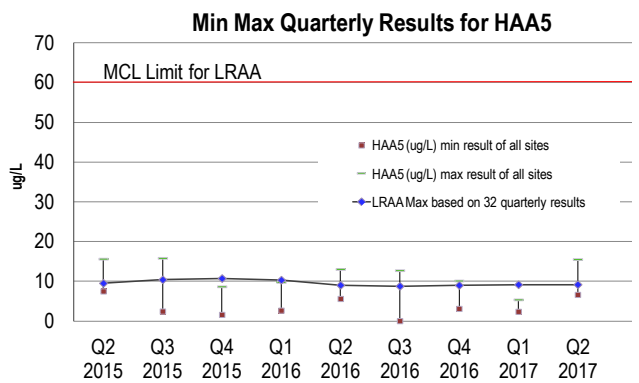
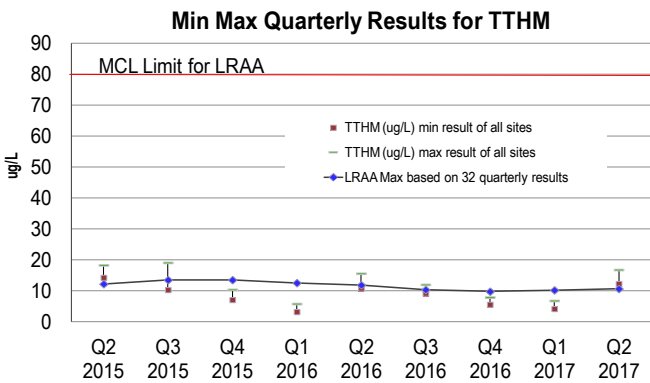
The locational running annual average at each individual sampling location must be below the standard. The charts below show the highest and lowest single values for all sites, and the LRAA of the highest location each quarter.

Partially served and CVA communities are responsible for their own compliance monitoring and reporting, and must be contacted directly for their individual results. The chart below combines all three CVA communities data (Chicopee, Wilbraham and South Hadley FD1).

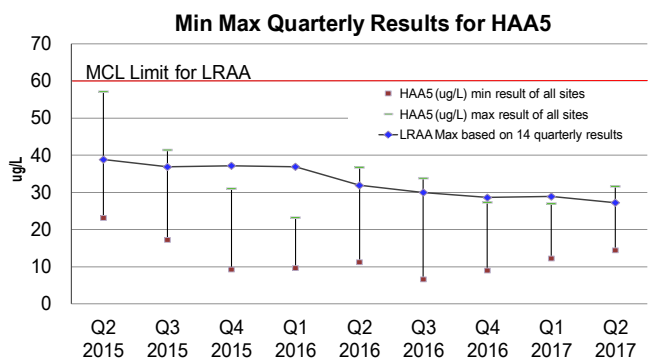
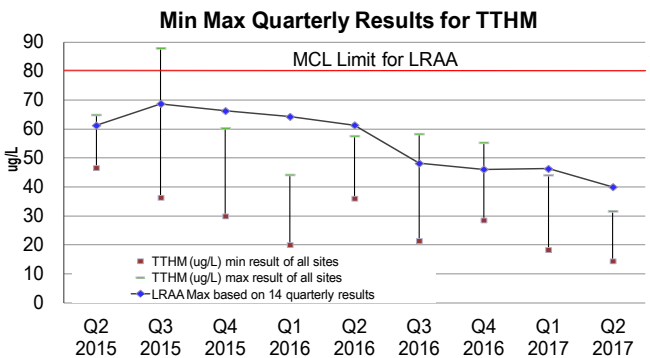
Bromate is tested monthly per DEP requirements for water systems that treat with ozone. Bromide in the raw water may be converted into bromate following ozonation. EPA’s RAA MCL standard for bromate is 10 µg/L.

The LRAA for TTHMs and HAA5s for MWRA’s Compliance Program (represented as the line in the top two graphs below) remain below current standards. The Max LRAA in the quarter for TTHMs = 10.7 µg/L; HAA5s = 9.2 µg/L. The current RAA for Bromate = 0.0 µg/L. CVA’s DBP levels continue to be below current standards.

MetroBoston Disinfection By-Products



CVA Disinfection By-Products (Combined Results)



Water Supply and Source Water Management

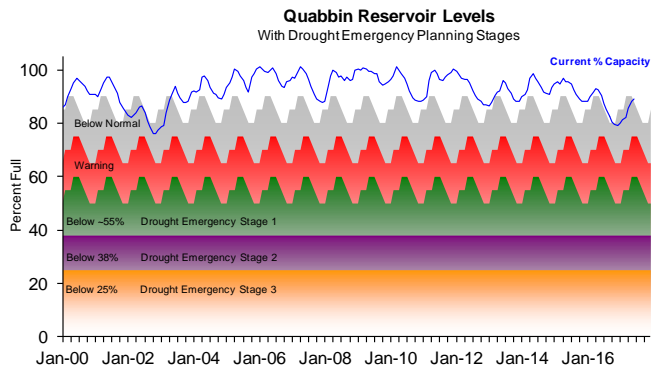
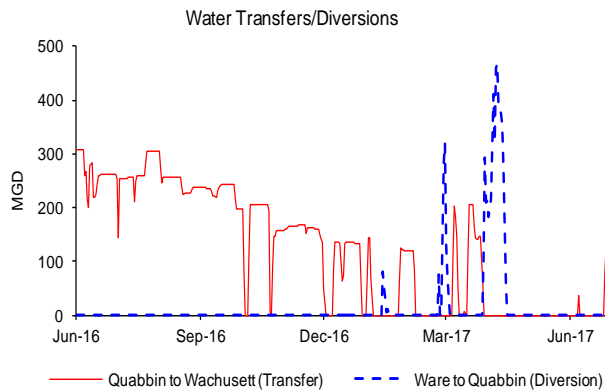
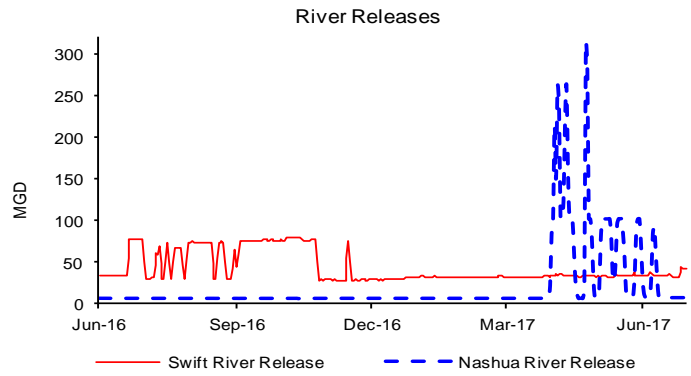
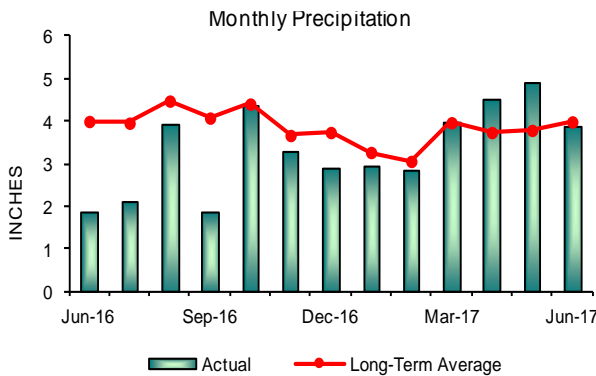
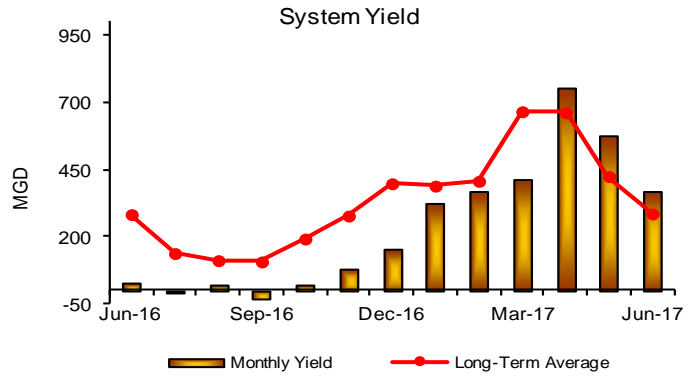
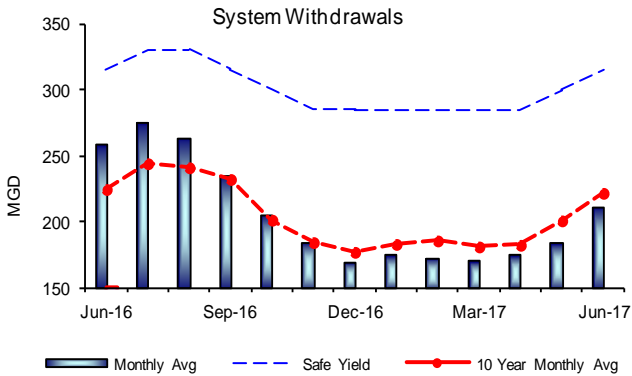
4th Quarter – FY17

Background

A reliable supply of water in MWRA's reservoirs depends on adequate precipitation during the year and seasonal hydrologic inputs from watersheds that surround the reservoirs. Demand for water typically increases with higher summer temperatures and then decreases as temperatures decline. Quabbin Reservoir was designed to effectively supply water to the service areas under a range of climatic conditions and has the ability to endure a range of fluctuations. Wachusett Reservoir serves as a terminal reservoir to meet the daily demands of the Greater Boston area. A key component to this reservoir's operation is the seasonal transfer of Quabbin Reservoir water to enhance water quality during high demand periods. On an annual basis, Quabbin Reservoir accounts for nearly 50% of the water supplied to Greater Boston. The water quality of both reservoirs (as well as the Ware River, which is also part of the System Safe Yield) depend upon implementation of DCR's DEP-approved Watershed Protection Plans. System Yield is defined as the water produced by its sources, and is reported as the net change in water available for water supply and operating requirements.

Outcome

Quabbin Reservoir level return to normal operating range on June 12th. The volume of the Quabbin Reservoir was at 89.3% as of June 30, 2017; a 7.2% increase for the quarter, which represents a gain of 29.4 billion gallons of storage. Yield and precipitation for the quarter were above their respective quarterly long term averages. System withdrawal for the quarter was below the 10 year monthly average.



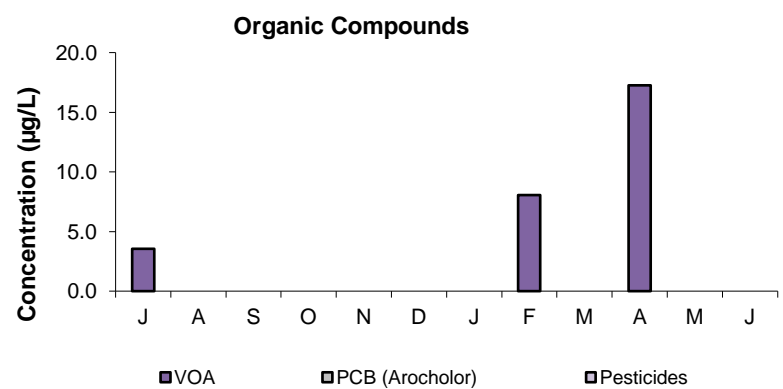
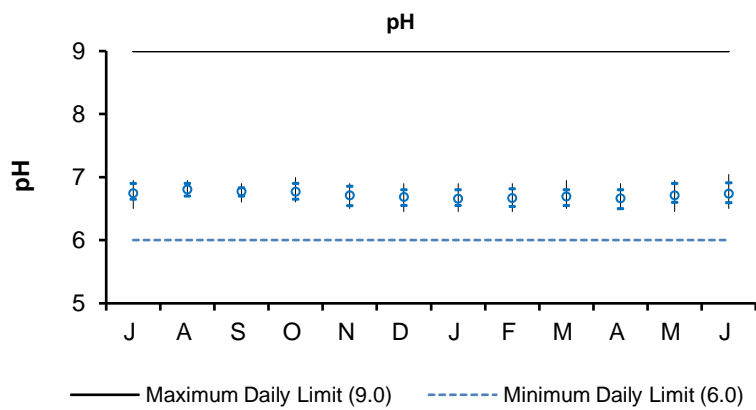
WASTEWATER QUALITY

NPDES Permit Compliance: Deer Island Treatment Plant 4th Quarter - FY17

NPDES Permit Limits

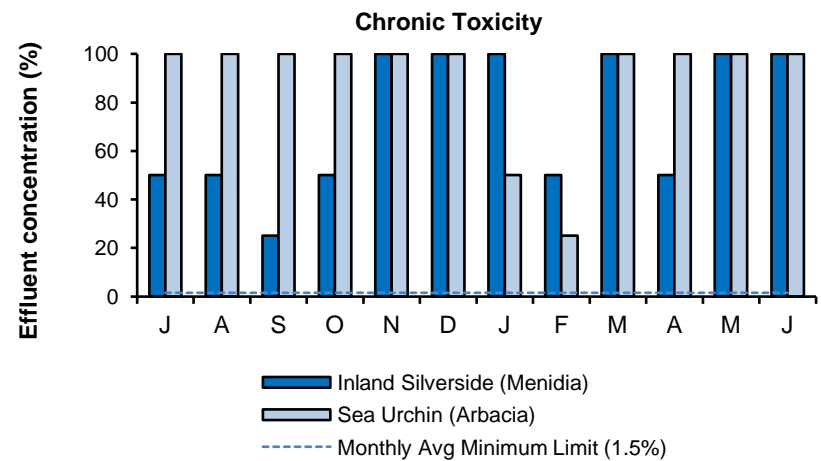
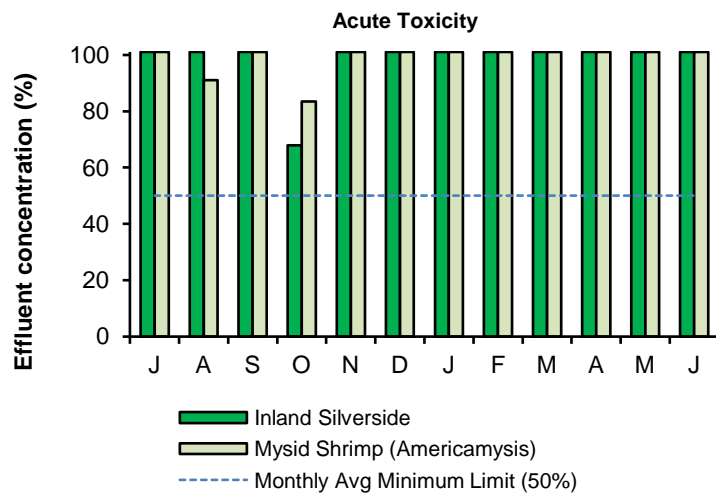
Effluent Characteristics		Units	Limits	April	May	June	4th Quarter Violations	FY17 YTD Violations
Dry Day Flow:		mgd	436	257.2	263.6	270.6	0	0
cBOD:	Monthly Average	mg/L	25	8.3	4.5	5.2	0	0
	Weekly Average	mg/L	40	12.6	5.9	5.8	0	0
TSS:	Monthly Average	mg/L	30	17.1	7.9	8.2	0	0
	Weekly Average	mg/L	45	29.3	11.5	10.8	0	0
TCR:	Monthly Average	ug/L	456	0	0	0.44	0	0
	Daily Maximum	ug/L	631	0	0	13	0	0
Fecal Coliform:	Daily Geometric Mean	col/100mL	14000	13	7	7	0	0
	Weekly Geometric Mean	col/100mL	14000	52	13	16	0	0
	% of Samples >14000	%	10	0	0	0	0	0
	Consecutive Samples >14000	#	3	0	0	0	0	0
pH:		SU	6.0-9.0	6.5-6.9	6.5-7.0	6.5-7.1	0	0
PCB, Aroclors:	Monthly Average	ug/L	0.000045	UNDETECTED			0	0
Acute Toxicity:	Mysid Shrimp	%	≥50	>100	>100	>100	0	0
	Inland Silverside	%	≥50	>100	>100	>100	0	0
Chronic Toxicity:	Sea Urchin	%	≥1.5	100	100	100	0	0
	Inland Silverside	%	≥1.5	50	100	100	0	0

There have been no permit violations in FY17 to date at the Deer Island Treatment Plant.



An important wastewater component monitored in the effluent is organic compounds, such as volatile organic acids, pesticides, and polychlorinated biphenyls, which are all sampled monthly. The secondary treatment process significantly reduces organic compounds in the effluent stream. In the 4th Quarter, some volatile organic compounds (acetone) were detected in the effluent in April. However, volatile organic compounds do not have discharge limitations in the Deer Island NPDES permit; they are to be reported only. All other organic compounds were below the detection limit for the quarter.

pH is a measure of alkalinity or acidity. Fluctuations in effluent pH are unlikely to impact on marine environments, which have significant buffering capacity. Because of the pure oxygen used in the activated sludge process, effluent pH tends to be at the lower end of the permit-required range. All pH measurements for the 4th Quarter were within the daily permit limits.



The acute toxicity test simulates the short-term toxic effects of chemicals in wastewater effluent on marine animals. The test measures the concentration (percent) of effluent that kills half the test organisms within four days. The higher the concentration of effluent required, the less toxic the effluent. For permit compliance, the effluent concentration that causes mortality to mysid shrimp and inland silverside must be at least 50%. Acute toxicity permit limits were met for the 4th Quarter for both the inland silverside and mysid shrimp.

Typically, effects of chronic exposures differ from those of acute exposures. Because of this, chronic toxicity responses are not necessarily related to acute toxicity. The chronic toxicity test simulates the long-term toxic effects of chemicals in wastewater effluent on marine animals. To meet permit limits, a solution of 1.5% effluent and 98.5% dilution water must show no observed effect on the growth and reproduction of the test species. Chronic toxicity permit limits were met for the 4th Quarter for both the inland silverside and sea urchin.

NPDES Permit Compliance: Clinton Wastewater Treatment Plant 4th Quarter - FY17

NPDES Permit Limits

Effluent Characteristics	Units	Limits	April	May	June	4th Quarter Violations	FY17 YTD Violations	
Flow:	mgd	3.01	2.30	2.33	2.38	0	0	
BOD:	Monthly Average:	mg/L	3.8	3.4	3.4	0	0	
	Weekly Average:	mg/L	4.9	4.2	3.7	0	0	
TSS:	Monthly Average:	mg/L	5.0	3.3	4.3	0	0	
	Weekly Average:	mg/L	7.5	3.7	4.8	0	0	
pH:	SU	6.5-8.3	6.9-7.4	7.1-7.8	7.0-7.7	0	0	
Dissolved Oxygen:	Daily Average Minimum:	mg/L	8.5	8.3	8.1	0	0	
E. Coli:	Daily Geometric Mean:	cfu/100mL	409	9.0	9.0	131.3	0	0
	Monthly Geometric Mean:	cfu/100mL	126	5.0	5.0	6.3	0	0
TCR:	Monthly Average:	ug/L	17.6	0.0	0.0	0.0	0	0
	Daily Maximum:	ug/L	30.4	0.0	0.0	0.0	0	0
Total Ammonia Nitrogen: June 1st - October 31st								
	Monthly Average:	mg/L	10.0	0.21	0.03	0.01	0	0
	Daily Maximum:	mg/L	35.2	0.63	0.13	0.04	0	0
Copper:	Monthly Average:	ug/L	11.6	3.2	4.1	7.5	0	0
	Daily Maximum:	ug/L	14.0	3.2	4.1	8.4	0	0
Phosphorus: April 1st - October 31st								
	Monthly Average:	mg/L	1.0	0.19	0.37	0.53	0	0
Acute Toxicity:	Daily Minimum:	%	≥100	*N/A	*N/A	>100	0	0
Chronic Toxicity:	Daily Minimum:	%	≥62.5	*N/A	*N/A	100	0	1

There have been no permit violations in FY17 at the Clinton Treatment Plant. March 2017 was the first month under the new NPDES permit.

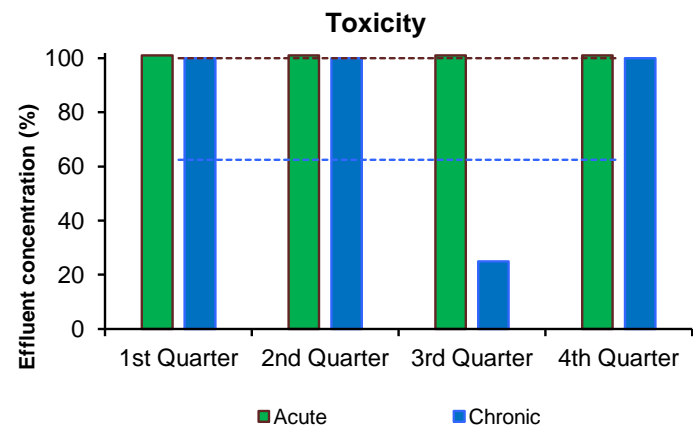
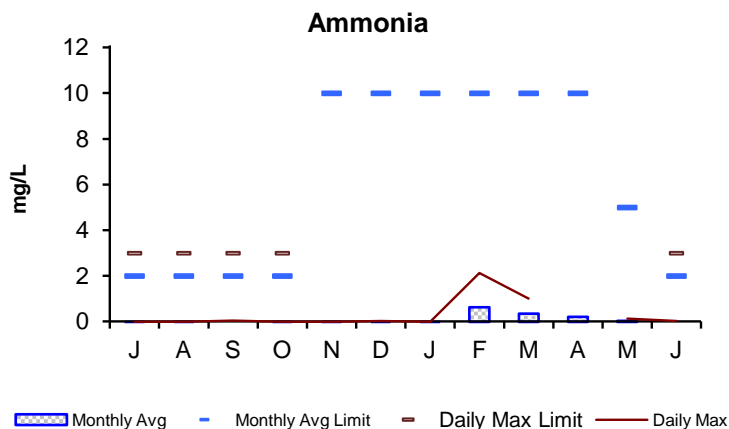
1st Quarter: There were no permit violations in the first quarter.

2nd Quarter: There were no permit violations in the second quarter.

3rd Quarter: There was one permit violation in the third quarter; the chronic toxicity was 25%, which is below the permit limit of 62.5%

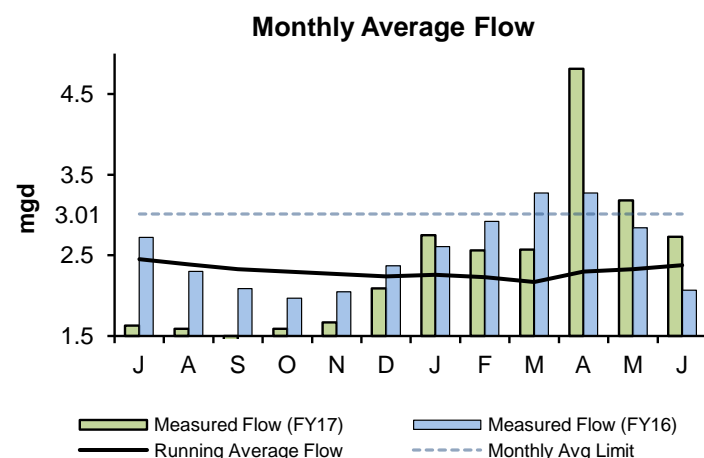
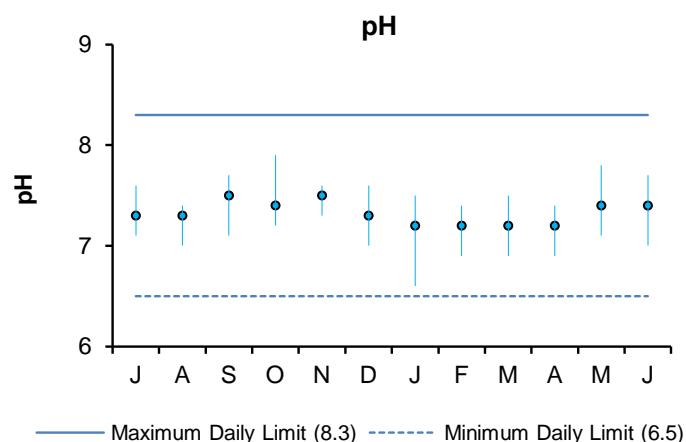
4th Quarter: There were no permit violations in the fourth quarter.

*Toxicity testing at the Clinton Treatment Plant is conducted on a quarterly basis.



The 4th Quarter's monthly average and daily maximum concentrations were below the permit limits. The monthly average and daily maximum limits for the 4th Quarter are variable, dropping to 2 mg/L and 3 mg/L in June, respectively. The permit limits are most stringent from June to October when warm weather conditions are most conducive to potential eutrophication.

Acute and chronic toxicity testing simulates the short- and long-term toxic effects of chemicals in wastewater effluent on aquatic animals. For permit compliance, the effluent concentration that causes mortality to the daphnid in acute and chronic testing must be at least >100% and 62.5%, respectively. There were no violations in the 4th Quarter.



pH is a measure of the alkalinity or acidity of the effluent. All daily pH results for the 4th Quarter were within the range set by the permit.

The graph depicts the running annual average monthly flow, measured in million gallons per day, exiting the plant. The average monthly flows during this Quarter were below the NPDES permit limit.

COMMUNITY FLOWS AND PROGRAMS

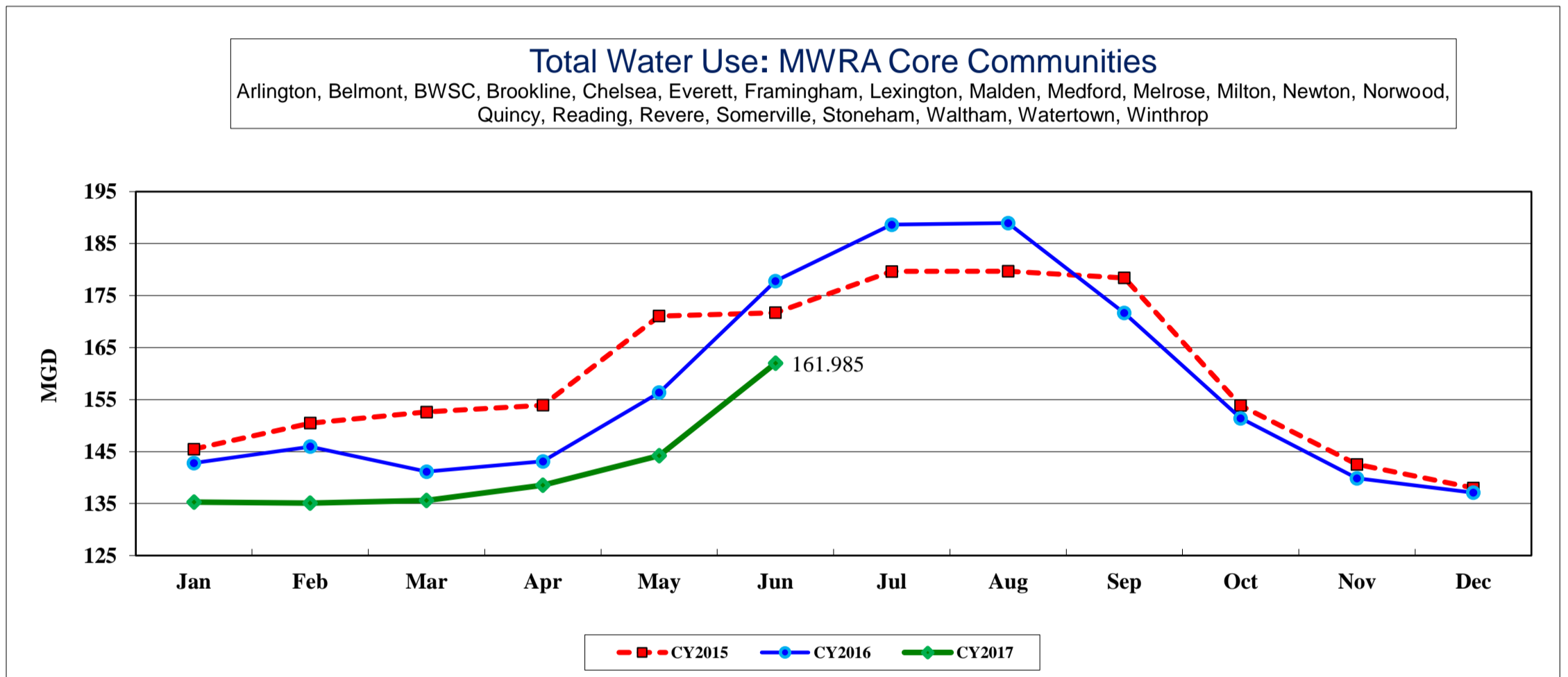
Total Water Use MWRA Core Customers 4th Quarter - FY17

Water USE : MWRA Fully Served Communities*

* Receive 100% MWRA Water Service

MGD	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD Average	Average
CY2015	145.466	150.488	152.603	153.932	171.068	171.693	179.652	179.689	178.407	153.846	142.547	138.005	159.839	159.839
CY2016	142.802	145.930	141.117	143.104	156.336	177.803	188.652	188.959	171.633	151.405	139.847	137.094	151.138	157.106
CY2017	135.309	135.085	135.580	138.527	144.182	161.985							141.795	141.795

MG	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD Total	Total
CY2015	4,509.447	4,213.655	4,730.692	4,617.960	5,303.114	5,150.793	5,569.210	5,570.350	5,352.198	4,769.225	4,276.398	4,278.141	58,341.183	58,341.183
CY2016	4,426.874	4,231.969	4,374.642	4,293.123	4,846.430	5,334.082	5,848.205	5,857.743	5,148.989	4,693.548	4,195.395	4,249.903	27,507.119	57,500.901
CY2017	4,194.586	3,782.379	4,202.965	4,155.824	4,469.647	4,859.559							25,664.960	25,664.960



Water Supplied: All MWRA Water Customer Communities

The June 2017 Community Water Use Report recently distributed to communities served by the MWRA waterworks systems. Each community's annual water use relative to the system as a whole is the primary factor in allocating the annual water rate revenue requirement to MWRA water communities. Calendar year 2017 water use will be used to allocate the FY19 water utility rate revenue requirement.

June 2017 water supplied of 206.5 mgd (for revenue generating users) is down 30.1 mgd or 12.7% compared to June 2016.

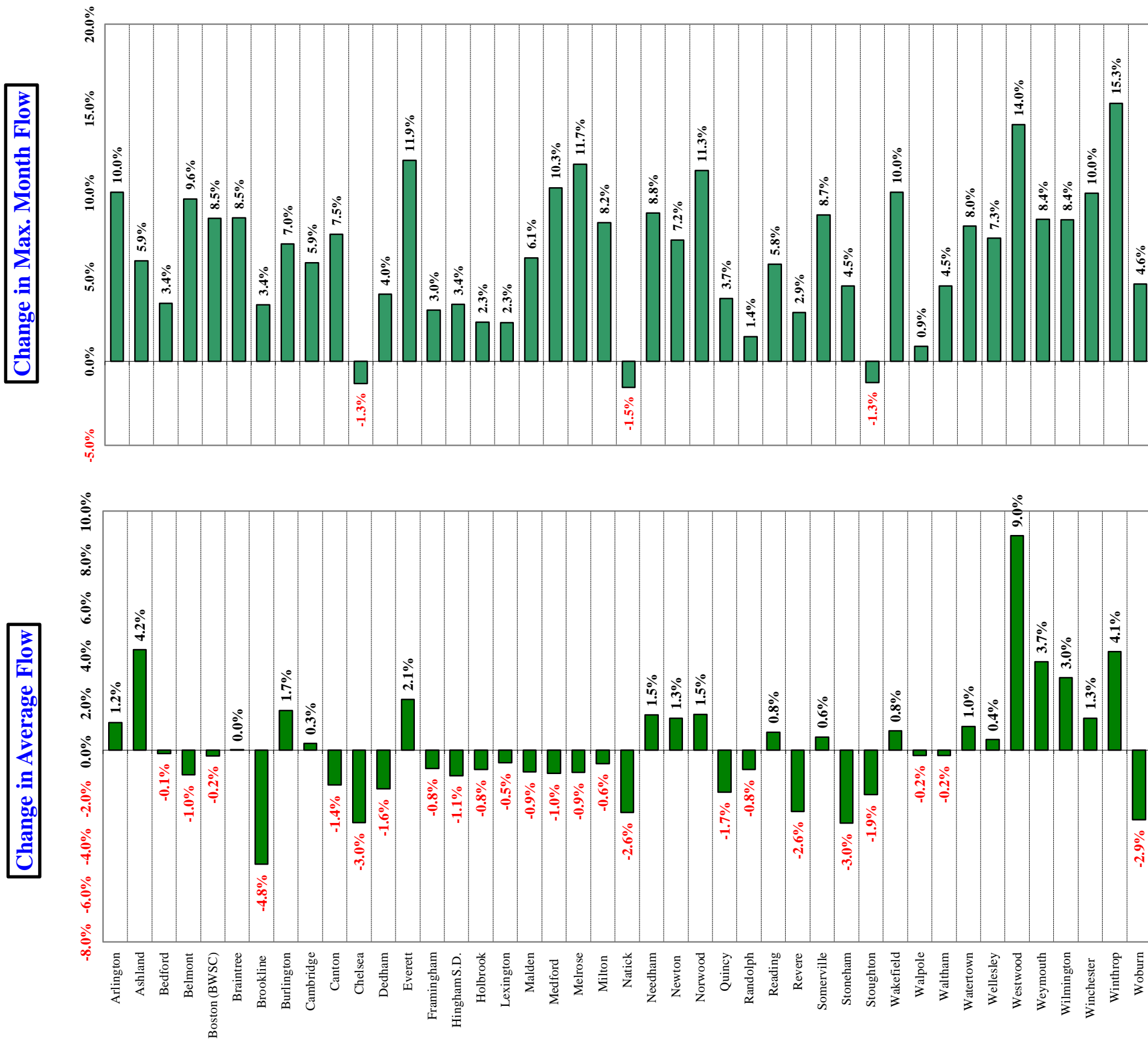
System-wide year to date consumption for CY17 remains lower than CY16 with 173.3 mgd being supplied to MWRA customers **through June**. This is 13.7 mgd lower than CY16 and is a decrease of **7.3%**.

Community Wastewater Flows

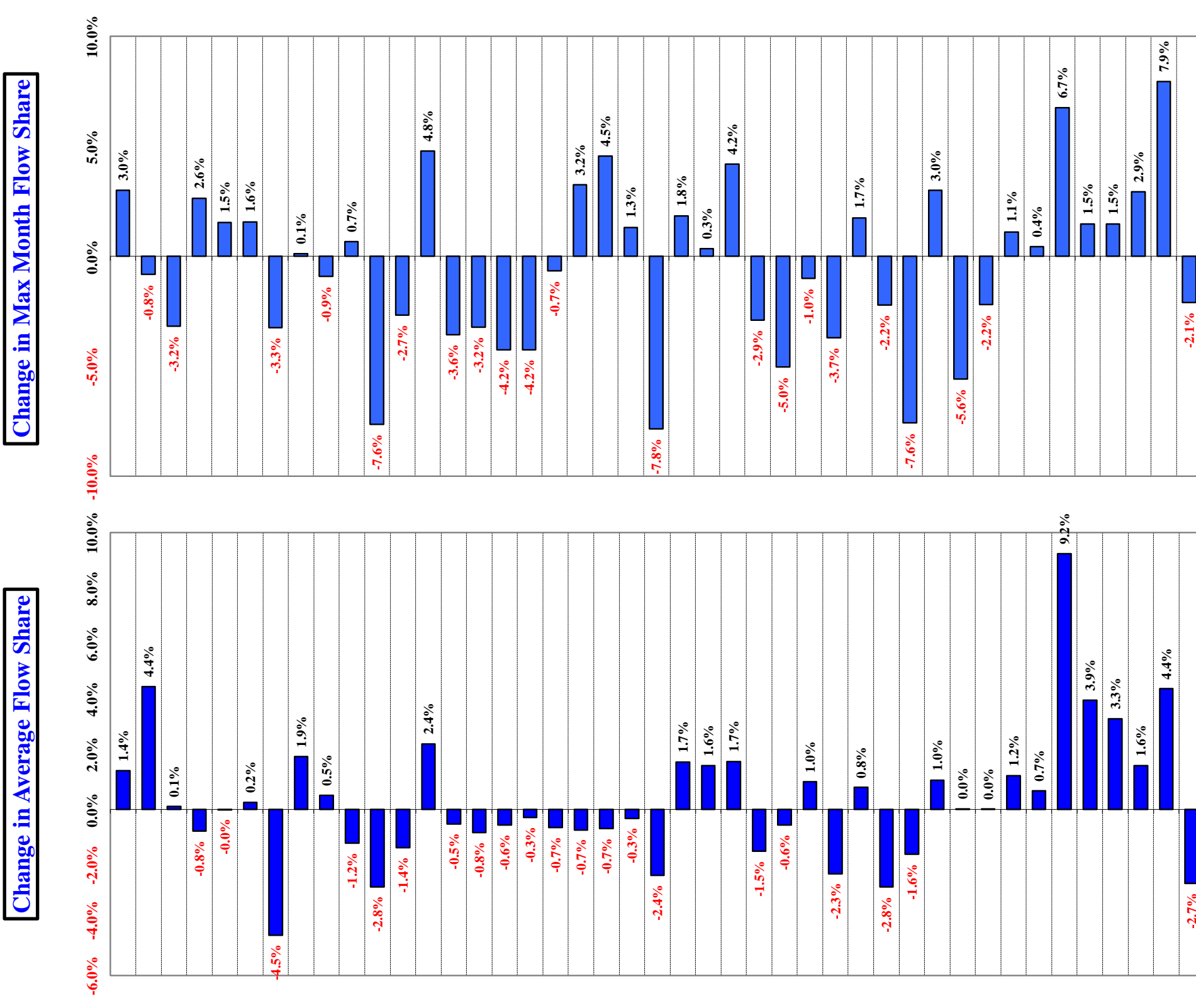
4th Quarter - FY17

How Projected CY2017 Community Wastewater Flows Could Effect FY2019 Sewer Assessments ^{1,2,3}

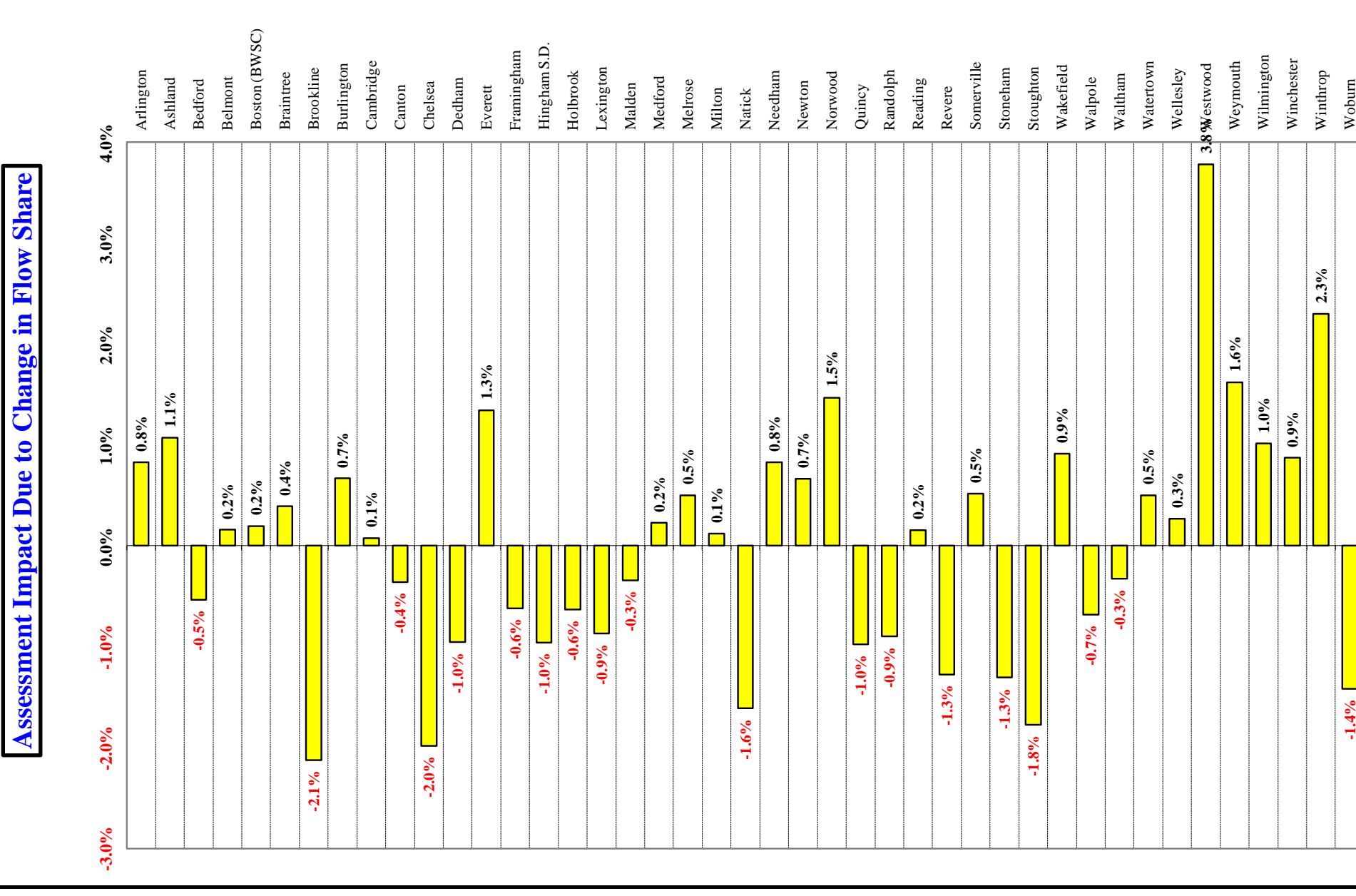
The flow components of FY2019 sewer assessments will be calculated using a 3-year average of CY2015 to CY2017 wastewater flows compared to FY2018 assessments that used a 3-year average of CY2014 to CY2016 wastewater flows.



But as MWRA's sewer assessments are a ZERO-SUM calculation, a community's assessment is strongly influenced by the RELATIVE change in CY2015 to CY2017 flow share compared to CY2014 to CY2016 flow share, compared to all other communities in the system.



The chart below illustrates the change in the TOTAL BASE assessment due to FLOW SHARE CHANGES. ⁴



Notes:

¹ MWRA uses a 3-year flow average to calculate sewer assessments. Three-year averaging smoothes the impact of year-to-year changes in community flow share, but does not eliminate the long-term impact of changes in each community's relative contribution to the total flow.

² Based on CY2014 to CY2017 average wastewater flows as of 08/03/17. Flow data is preliminary and subject to change pending additional MWRA and community review.

³ CY2014 to June CY2017 wastewater flows based on actual meter data. July-December CY2017 based on the average of the three prior years.

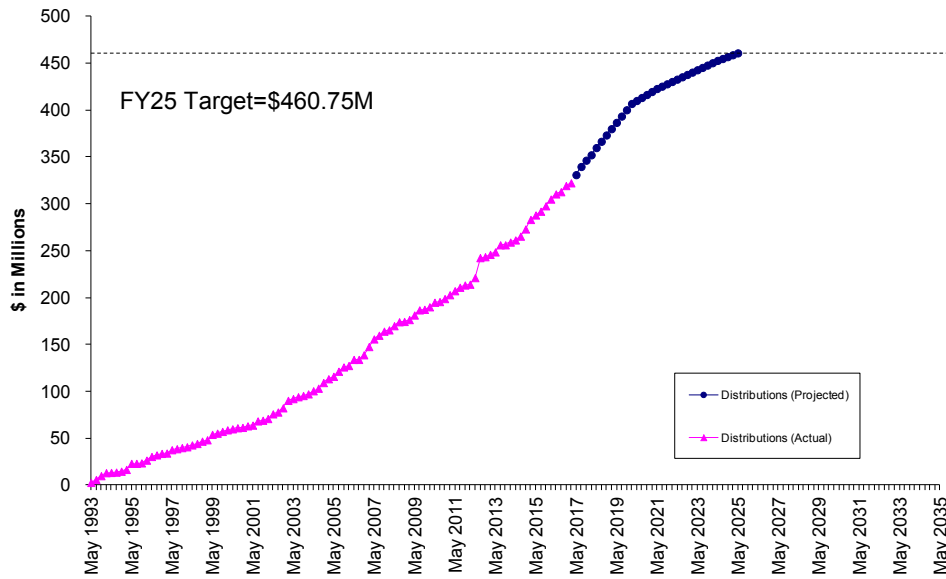
⁴ Represents **ONLY** the impact on the total BASE assessment resulting from the changes in average and maximum wastewater **FLOW SHARES**.

Community Support Programs 4th Quarter – FY17

Infiltration/Inflow Local Financial Assistance Program

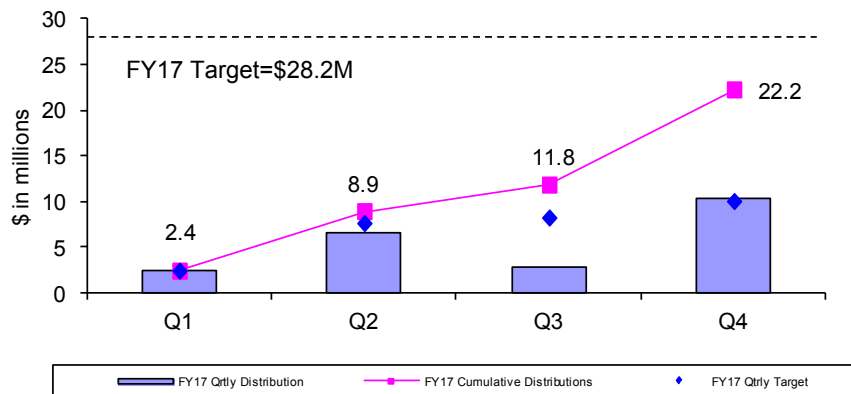
MWRA's Infiltration/Inflow (I/I) Local Financial Assistance Program provides \$460.75 million in grants and interest-free loans (average of about \$14 million per year from FY93 through FY25) to member sewer communities to perform I/I reduction and sewer system rehabilitation projects within their locally-owned collection systems. Eligible project costs include: sewer rehabilitation construction, pipeline replacement, removal of public and private inflow sources, I/I reduction planning, engineering design, engineering services during construction, etc. I/I Local Financial Assistance Program funds are allocated to member sewer communities based on their percent share of MWRA's wholesale sewer charge. Phase 1-8 funds (total \$300.75 million) were distributed as 45% grants and 55% loans with interest-free loans repaid to MWRA over a five-year period. Phase 9 and 10 funds (total \$160 million) are distributed as 75% grants and 25% loans with interest-free loans repaid to MWRA over a ten-year period.

I/I Local Financial Assistance Program Distribution FY93-FY25



During the 4th Quarter of FY17, \$10.4 million in financial assistance (grants and interest-free loans) was distributed to fund local sewer rehabilitation projects in Boston, Natick and Wakefield. Total grant/loan distribution for FY17 is \$22.2 million. From FY93 through the 4th Quarter of FY17, all 43 member sewer communities have participated in the program and more than \$332 million has been distributed to fund 528 local I/I reduction and sewer system rehabilitation projects. Distribution of the remaining funds has been approved through FY25 and community loan repayments will be made through FY36. All scheduled community loan repayments have been made.

FY17 Quarterly Distributions of Sewer Grant/Loans



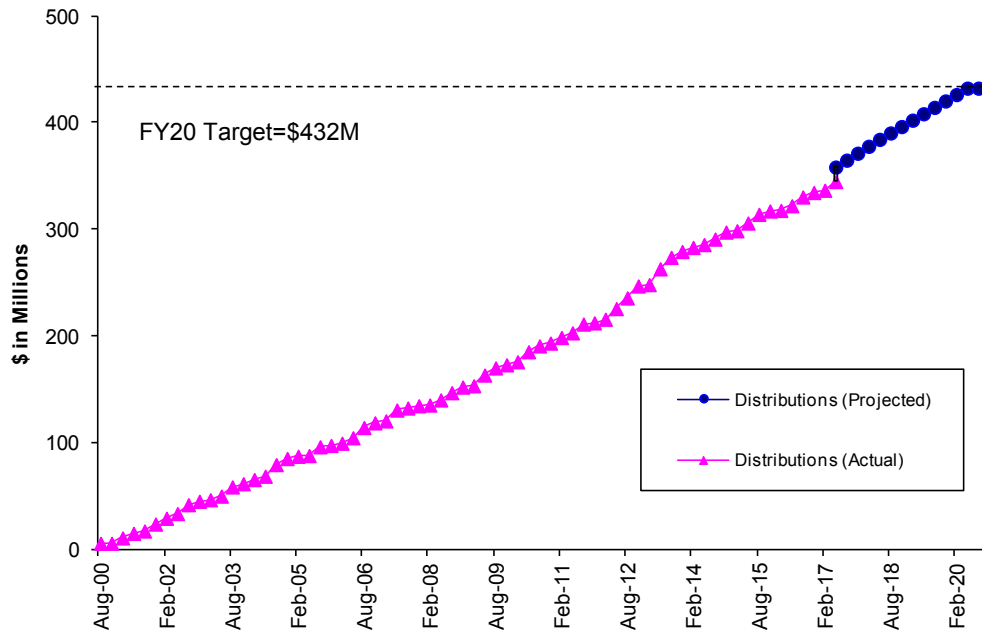
Community Support Programs

4th Quarter – FY17

Local Water System Assistance Program

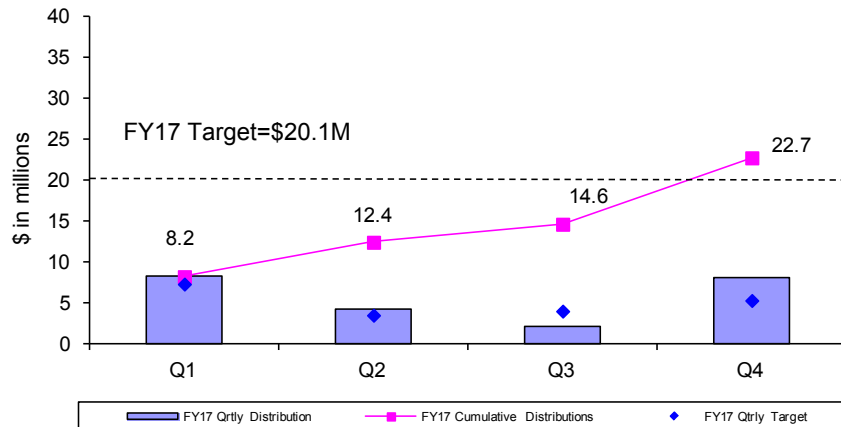
MWRA's Local Water System Assistance Programs (LWSAP) provides \$432 million in interest-free loans (an average of about \$22 million per year from FY01 through FY20) to member water communities to perform water main rehabilitation projects within their locally-owned water distribution systems. Eligible project costs include: water main cleaning/lining, replacement of unlined water mains, lead service replacements, valve, hydrant, water meter, tank work, engineering design, engineering services during construction, etc. MWRA partially-supplied communities receive pro-rated funding allocations based on their percentage use of MWRA water. Interest-free loans are repaid to MWRA over a ten-year period beginning one year after distribution of the funds. The Phase 1 water loan program concluded in FY13 with \$222 million in loan distributions. The Phase 2 - LWSAP continues distributions through FY20.

Local Water System Assistance Program Distribution FY01-FY20



During the 4th Quarter of FY17, \$8.1 million in interest-free loans was distributed to fund local water projects in Arlington, Chicopee, Northborough, Waltham and Woburn. Total loan distribution for FY17 is \$22.7 million. From FY01 through the 4th Quarter of FY17, more than \$344 million has been distributed to fund 385 local water system rehabilitation projects in 39 MWRA member water communities. Distribution of the remaining funds has been approved through FY20 and community loan repayments will be made through FY30. All scheduled community loan repayments have been made.

FY17 Quarterly Distributions of Water Loans



Community Support Programs

4th Quarter – FY17

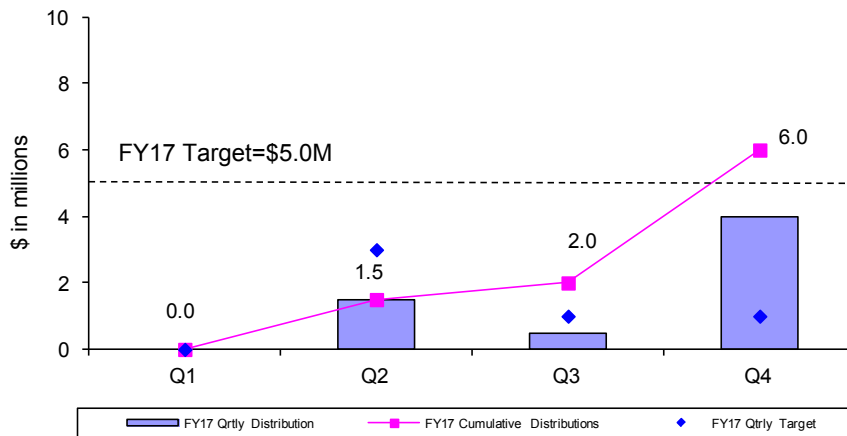
Lead Service Line Replacement Loan Program

By its vote on March 16, 2016, the Board approved an enhancement to the Local Water System Assistance Program to provide up to \$100 million in 10-year zero-interest loans to communities solely for efforts to fully replace lead service lines. The Lead Service Line Replacement Loan Program is also referenced as the Lead Loan Program or LLP. Each community can develop its own program, tailored to their local circumstances. MWRA's goal in providing financial assistance to member communities is to improve local water systems so that the high quality water MWRA delivers can make it all the way to the consumer's tap. The presence of a lead service line connecting a home to the main in the street can lead to elevated lead levels in tap water, especially if that water sits stagnant for an extended period. MWRA's stable water quality and effective corrosion control treatment reduce the risk that a lead service line will cause elevated lead levels, and measured lead levels in high risk homes have decreased by 90 percent since corrosion control was brought on-line in 1996. However, the risk of elevated levels remains as long as lead service lines are in use.

FY17 is the first year of the Lead Service Line Replacement Loan Program. During the 4th Quarter of FY17, MWRA made the third Lead Loan Program distribution to Newton for \$4.0 Million.

FY17 Lead Loan Program distributions include:	Quincy:	\$1.5 Million
	Winchester:	\$0.5 Million
	<u>Newton:</u>	<u>\$4.0 Million</u>
	Total	\$6.0 Million

FY17 Quarterly Distributions of Lead Service Line Replacement Loans

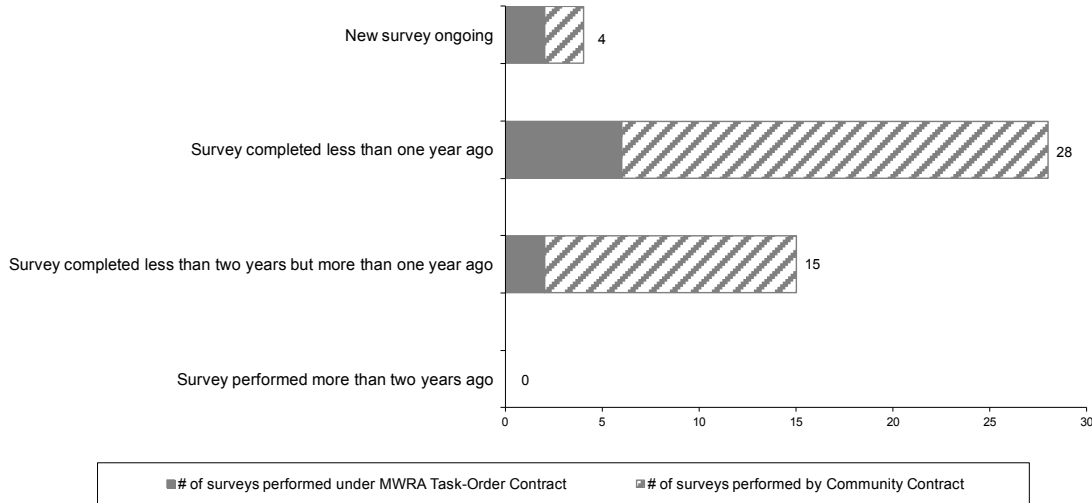


Community Support Programs

4th Quarter – FY17

Community Water System Leak Detection

To ensure member water communities identify and repair leaks in locally-owned distribution systems, MWRA developed leak detection regulations that went into effect in July 1991. Communities purchasing water from MWRA are required to complete a leak detection survey of their entire distribution system at least once every two years. Communities can accomplish the survey using their own contractors or municipal crews; or alternatively, using MWRA’s task order leak detection contract. MWRA’s task order contract provides leak detection services at a reasonable cost that has been competitively procured (3-year, low-bid contract) taking advantage of the large volume of work anticipated throughout the regional system. Leak detection services performed under the task order contract are paid for by MWRA and the costs are billed to the community the following year. During the 4th Quarter of FY17, all member water communities were in compliance with MWRA’s Leak Detection Regulation.



Community Water Conservation Outreach

MWRA’s Community Water Conservation Program helps to maintain average water demand below the regional water system’s safe yield of 300 mgd. Current 5-year average water demand is less than 205 mgd. The local Water Conservation Program includes distribution of water conservation education brochures (indoor and outdoor bill-stuffers) and low-flow water fixtures and related materials (shower heads, faucet aerators, toilet leak detection dye tabs, and instructions), all at no cost to member communities or individual customers. The Program’s annual budget is \$25,000 for printing and purchase of materials. Annual distribution targets and totals are provided in the table below. Distributions of water conservation materials are made based on requests from member communities and individual customers.

	Annual Target	Q1	Q2	Q3	Q4	Annual Total
Educational Brochures	100,000	324	20,778	73,882	84,885	179,869
Low-Flow Fixtures (showerheads and faucet aerators)	10,000	3,162	1,944	3,972	1,907	10,985
Toilet Leak Detection Dye Tablets	-----	2,265	2,814	2,017	545	7,641

BUSINESS SERVICES

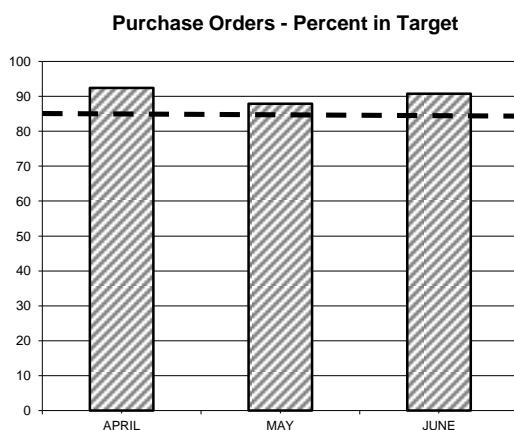
Procurement: Purchasing and Contracts

4th Quarter - FY17

Background: Goal is to process 85% of Purchase Orders and 80% of Contracts within Target timeframes.

Outcome: Processed 90% of purchase orders within target; Average Processing Time was 4.92 days vs. 5.46 days in Qtr 4 of FY16. Processed 81% (17 of 21) of contracts within target timeframes; Average Processing Time was 100 days vs. 92 days in Qtr 4 of FY16.

Purchasing



	No.	TARGET	PERCENT IN TARGET
\$0 - \$500	774	3 DAYS	94.7%
\$500 - \$2K	700	7 DAYS	94.1%
\$2K - \$5K	426	10 DAYS	94.8%
\$5K - \$10K	50	25 DAYS	88.0%
\$10K - \$25K	69	30 DAYS	88.4%
\$25K - \$50K	14	60 DAYS	100.0%
Over \$50K	30	90 DAYS	86.6%

The Purchasing Unit processed 2063 purchase orders, 240 less than the 2303 processed in Qtr 4 of FY16 for a total value of \$11,418,802 versus a dollar value of \$10,425,430 in Qtr 4 of FY16.

The purchase order processing targets were met for all purchase order dollar amount categories.

Contracts, Change Orders and Amendments

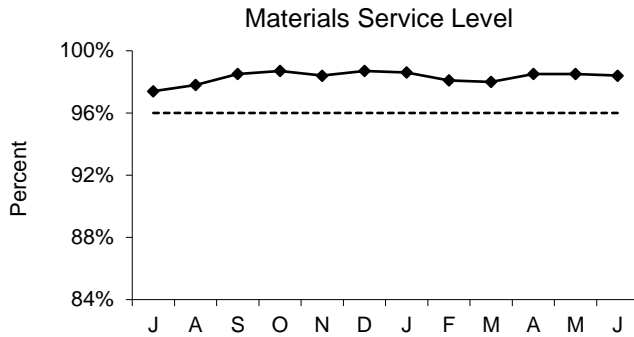
Four contracts were not processed within the target timeframes. One due to an extension of the bid date to increase competition, staff summary requirements and re-prioritization of assignments; another due to required changes to bid documents as a result of a change in contract type from a non-professional services contract to a construction contract; a third due to additional time required to answer bidder questions; and the fourth due to required revisions to the consultant's compensation tables.

Procurement processed twenty one contracts with a value of \$27,408,412 and eight amendments with a value of \$1,601,585. Twenty three change orders were executed during the period. The dollar value of all non-credit change orders during Q4 FY17 was \$1,304,133 and the value of credit change orders was (\$376,184).

Staff reviewed 66 proposed change orders and 29 draft change orders.

Materials Management

4th Quarter - FY17



The service level is the percentage of stock requests filled. The goal is to maintain a service level of 96%. Staff issued 8,676 (98.4%) of the 8,819 items requested in Q4 from the inventory locations for a total dollar value of \$1,282,868.

Inventory Value - All Sites

Inventory goals focus on:

- Maintaining optimum levels of consumables and spare parts inventory
- Adding new items to inventory to meet changing business needs
- Reviewing consumables and spare parts for obsolescence
- Managing and controlling valuable equipment and tools via the Property Pass Program

The FY17 goal is to reduce consumable inventory from the July '16 base level (\$8.10 million) by 2.0% (approximately \$162,164), to \$7.94 million by June 30, 2017 (see chart below).

Items added to inventory this quarter include:

- Deer Island – expansion valves and power supplies for HVAC; abrasives, wire brushes, stainless steel knotted wheels for Machine shops; o-rings, thermal grease and transducers for I&C; flashlights, mitt dispensers and panel braces for Facilities; solar panels, swivel fittings, calibration gas and adjustable meters for Core.
- Chelsea – housing, stem nuts, intake valves, gaskets and o-rings for planning; input modules, output cards and power supplies for SCADA; engine oil, seals and belts for Maintenance; battery protector cleaner, power steering hoses and ducts, rotors and fan belts for Fleet Services; refrigerator for Field Operations.
- Southboro – badge holders for Administration; velcro for Fleet Services and bearings for Maintenance.

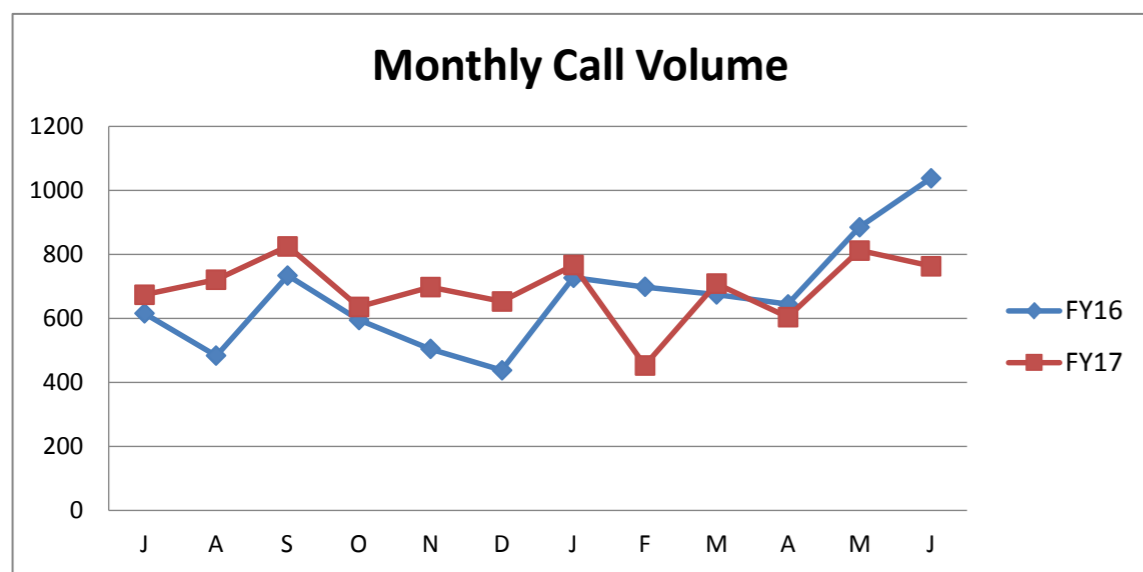
Property Pass Program:

- One audit was conducted during Q4.
- Scrap revenue received for Q4 amounted to \$14,367. Year to date revenue received amounted to \$39,270.
- Revenue received from online auctions held during Q4 amounted to \$264,364. Year to date revenue received amounted to \$478,446.

Items	Base Value July-16	Current Value w/o Cumulative New Adds	Reduction / Increase To Base
Consumable Inventory Value	8,108,240	7,954,061	-154,179
Spare Parts Inventory Value	8,841,332	8,837,452	-3,880
Total Inventory Value	16,949,572	16,791,513	-158,059

Note: New adds are items added at an inventory location for the first time for the purpose of servicing a group/department to meet their business needs/objectives.

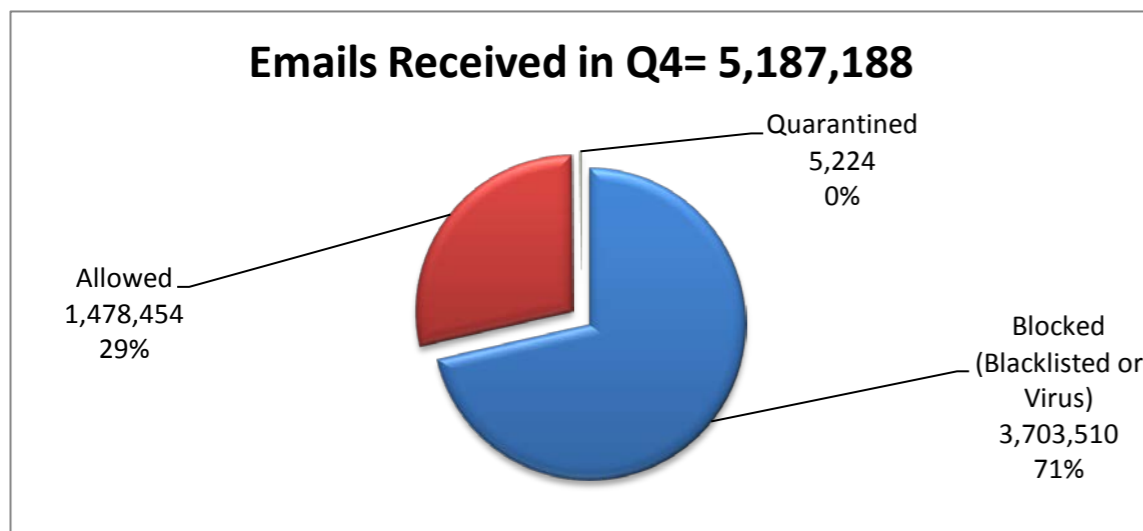
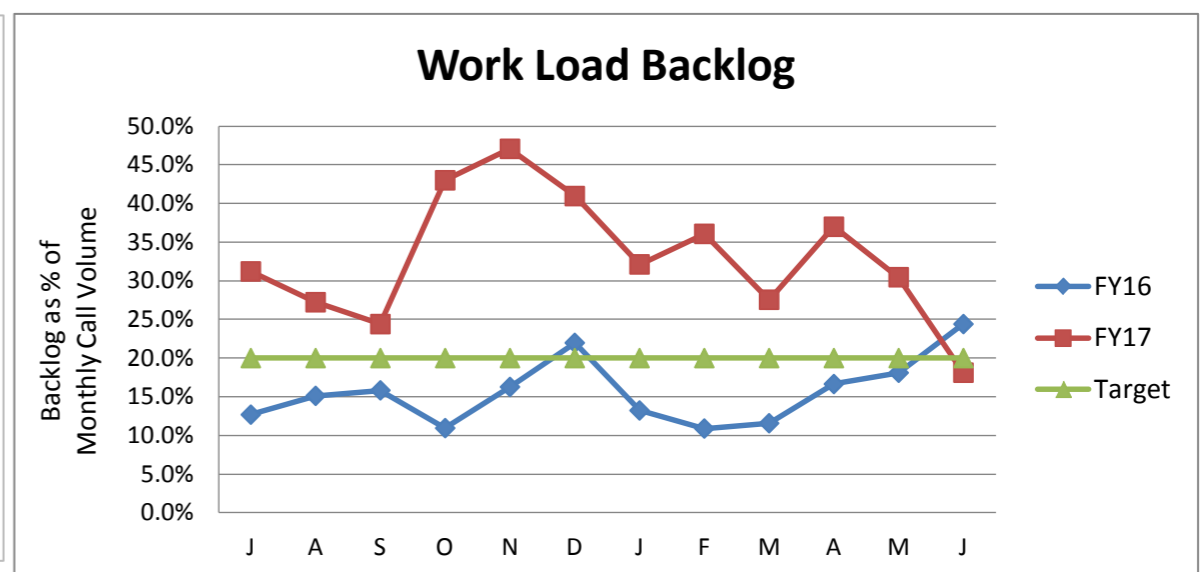
MIS Program 4th Quarter - FY17



Performance & Backlog

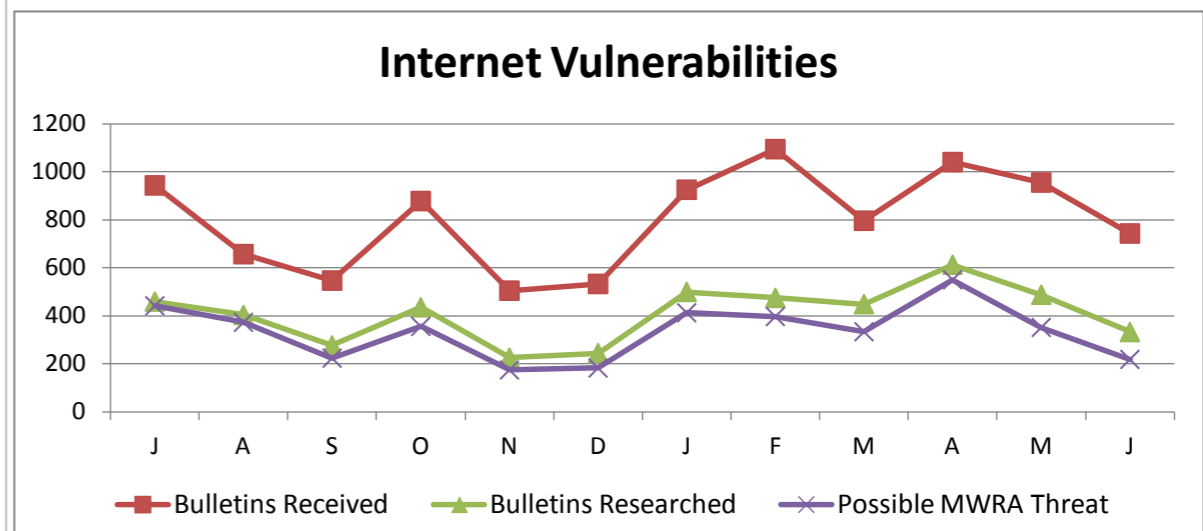
Call Volume: Peaked in May. FY17-Q4 call volume decreased by 15% from FY16-Q4.

Call Backlog: Peaked in May. FY17-Q4 backlog average is 8.5% above the targeted benchmark of 20%.



Information Security

In Q4, pushed security fixes/updates to desktops/servers protecting against 510 vulnerabilities. Landesk Antivirus quarantined 26 distinct viruses from 22 PCs. PCs are current with antivirus signatures for known malware.



Infrastructure:

Office 2016 Upgrade: Through the online training vendor, testers had training for 2016 Excel, Word, Access, Outlook, and PowerPoint available to them, effective 4/7/17. Continued supporting user testing of macros and databases.

Web Server Upgrade: Upgraded the hardware and software on the Web Server that hosts 68 internal web applications to Windows Server 2012 R2 and IIS 8.5. All applications were tested in this environment and are working without issue.

Wireless: New wireless infrastructure implemented for mobile application in the warehouses, laboratories, inspection truck bays and fleet management garages.

Information Security Program: 2017 Security Awareness training has been launched and consists of twelve training modules to be completed by March 30, 2018.

Applications/Training/Records Center:

Miscellaneous Infor/Lawson Support: Created custom retro program (MW288) due to the union contracts settlement and provided the Payroll department with information as requested. Applied the regulatory BSI bulletins across all three (DEV/PROD/DR) environments. The Regulatory Bulletin Tool is used to add new regulatory data to the system and to keep existing regulatory information current. Business Software, Inc. (BSI) is third-party software, used to maintain tax tables for the Infor Payroll application. BSI maintains tax changes such as tax rates, tax laws, and tax limits. Worked with Procurement Department to close over 700 old Purchase Orders for Inactive Buyers. Some of these Purchase Orders were accruing monthly. Closing these Purchase Orders improves MWRA's financial outlook and accuracy. Preparations to procure external vendor service for Lawson software upgrade started. This work is expected to begin in FY18-Q1.

Maximo Upgrade Project: Conducted Release 2 performance testing and Post-Release 2 Go-Live Support. Delivered "Spatial and Anywhere" training; this product allows for creation of spatially enabled work orders which identifies the location of the asset on the GIS map systems. "Anywhere Asset Audit" program was deployed to Citrix production environment. Asset Audit is used by MWRA staff for inventory (asset) validation. Version 7.6 Reports development is complete. 30% review and acceptance completed.

Maximo Control Desk: Continued supporting data migration efforts including extracting Magic Records, formatting records for vendor importing and preparing location files. Prepared a draft classification list for the service catalog and started to work on the Service Level Agreements for Control Desk on the development system. Completed testing Service Catalog process packs in new development environment and demonstrated the functionality to the project team. Completed use cases for selected workflows related to the current Magic Helpdesk application and created a template for the project team to use to document their processes. Completed a job aid on adding offerings in the Self Service Center.

LIMS & Electronic Library Notebook (ELN): Southborough Lab went Live in April allowing the replacement of 23 paper test logs with electronic logs. Two logs are remaining (pending user feedback) to be implemented to complete ELN Phase I, Drinking Water project. Implemented DEP Lab Auditors recommendation to increase Quality Control (QC) sampling volume. Notification defect with respect to Out Of Specs (OOS) reports rectified; real OOS results go to the clients, Quality Control (QC) OOS results go to laboratory staff.

PIMS: User acceptance testing for PIMS-Lawson interface modifications related to fee generation was completed.

Library & Records Center: The Library fulfilled 72 (207 YTD) research requests, and provided 521* (1,210 YTD) periodicals, standards, books & reports. Research topics included Brookline Reservoir Dam Drawings, Boston Harbor Cable boring data, copper sulfate treatment of algae, water and land rights for Wachusett Reservoir abutters. The Records Center added 214 (743 YTD) boxes, handled 289 (1,308 YTD) boxes, disposed of 245 (1,591 YTD) boxes and attended 3 (10 YTD) Records Conservation Board Meetings.

IT Training: For the quarter, 60 staff attended 11 classes. 49% of the workforce has attended at least one class year-to-date. 24 staff completed the Maximo Anywhere training. 15 staff completed the Maximo Spatial training. Completed Hands-on Introduction to MSWord 2016 and Introduction to Excel training manuals. Also completed Introduction to Maximo Work Orders student guide and taught the first/pilot class in Chelsea.

Legal Matters

4th Quarter - FY17

PROJECT ASSISTANCE

Court and Administrative Orders:

- **Boston Harbor Litigation and CSO:** Reviewed CSO Post Construction Compliance Scope of Work and drafted submittal letter. Reviewed and revised financial assistance agreement with BWSC for Dorchester Interceptor inflow removal. Reviewed and submitted semi-annual compliance and progress report.
- **Administrative Consent Order (DITP power outages):** Reviewed and submitted **final** semi-annual *Consultant's Deer Island Energy Recommendations Tracking Sheet* to DEP and EPA.

Real Estate, Contract, Environmental and Other Support:

- **NPDES:** Reviewed joint annual public notice on the progress of CSO control measures to improve the water quality of Alewife Brook required by Alewife Brook/Upper Mystic River CSO variance. Reviewed annual CSO discharge report for 2016 required by the Lower Charles River/Charles Basin and Alewife Brook/Upper Mystic River CSO variances. Reviewed MWRA's comments on the United States Environmental Protection Agency's retrospective review of its existing regulations pursuant to Executive Order 13777 (February 24, 2017). Reviewed letter to EPA and DEP notifying them of Harbor Electric Energy Company's plan to install a new electric power cable to supply DITP with power in lieu of relocating the existing cable and that MWRA will now only need to utilize its CTGs to supply DITP with power during the transition from old to new cable. Reviewed letter to EPA and DEP supplementing MWRA's application for renewal of its DITP NPDES Permit.
- **8(m) Permits:** Reviewed and approved sixty-five (65) 8(m) permits.
- **Wireless Cell Agreements:** Reviewed and revised template for wireless cell permit for the installation, operation, maintenance, replacement and removal of communications equipment on MWRA property. Reviewed and revised Sprint wireless cell permit agreement for the installation, operation, maintenance, replacement and removal of communications equipment at MWRA's Turkey Hill water facility.
- **Real Property:** Drafted MOA with Dedham-Westwood Water District for DWWD work that will be included as part of MWRA Contract 7505 – Dedham South related to Section 111 Southern Extra High Redundancy Pipeline Project. Recorded Order of Conditions DEP 337-1287 at Middlesex Registry of Deeds for work at 98 Riverside Road in Weston. Recorded affidavit and plans at Suffolk Registry of Deeds for Chelsea Creek Headworks pursuant to architectural access board's order. Recorded two temporary easements at Norfolk Registry of Deeds related to Section 111- Southern Extra High Redundancy Pipeline MWRA Contract 7505 in Dedham. Drafted letter agreement with the City of Malden related payment to MWRA by Malden for a portion of the cost of the abandonment and relocation of a portion of MWRA's Section 14 water main to accommodate the sale of the parcel of land at 200 Pleasant Street by the City of Malden to Malden Center LLC for development purposes. Reviewed MOU between Boston College and MWRA related to the Massachusetts Historical Commission's directive to Boston College concerning Boston College's construction of a new field house. Reviewed proposed DCAMM legislation releasing easement in Revere which was supplused by MWRA. Finalized MOA between the Town of Stoneham and MWRA related to the mitigation of impacts related to the construction of a new water main in Stoneham. Drafted license for Wynn, LLC. related to Wynn's potential placement of a time lapse camera at MWRA's DeLauri Pump Station in Boston. Reviewed deed from the United States to MWRA related to DITP parcels of land to confirm that MWRA met its 30 year obligations under the conveyance deed. Reviewed and revised letter agreement with the Town of Reading related to payment to MWRA from Reading for sidewalk rehabilitation work on Oak Street which will be performed under MWRA Contract 7471. Drafted license for Quincy Shipyard, LLC for the purpose of creating one entrance to Fore River Shipyard and for common use among Quincy Shipyard and MWRA for access to and egress from Fore River Shipyard. Drafted license for UMass for access to and use of areas at Deer Island Nut Island on the coastal side of the coastal protection and/or seawalls for the purpose of studying the community composition of intertidal communities living on human-engineered shorelines.
- **Watershed Preservation Restriction:** Reviewed Wachusett Reservoir Watershed Acquisition W-000504 located at 113 Temple Street in West Bolyston, MA. Reviewed Wachusett Reservoir Watershed Acquisition W-001055 and W-001056 located at Justice Hill Road in Sterling, MA.
- **Public Records Requests:** Responded to multiple public records requests. Denied one request re: disclosure of internal cost recovery procedures as protected by attorney-client privilege and work product doctrine.

Miscellaneous Assistance/Project Support:

- Assisted with c. 268A, section 7(e) disclosure options re: Water Supply Protection Trust
- Completed UCC search through D&B to determine non-existence of Ogin creditor rights in Deer Island wind turbine.
- Finalized release and indemnity agreement with Marlborough re: local fire department training exercise on MWRA premises.
- Reviewed draft Chapters 1, 2, 4, and 5 of MWRA's 2018 Wastewater Master Plan.

LABOR, EMPLOYMENT AND ADMINISTRATIVE

New Matters

A Charge was filed at the Massachusetts Commission Against Discrimination alleging that the MWRA discriminated against an employee on the basis of age, sexual orientation, and retaliation.

Matters Concluded

Received a dismissal from the MCAD for lack of probable cause of a charge of discrimination on the basis of retaliation.

LITIGATION/TRAC

New Matters Current Employee v. MWRA: Plaintiff, a current employee of MWRA, alleges that on February 2012, an arbitrator rendered an award in his favor as to retroactive pay and negotiation of an appropriate pay grade. Plaintiff seeks to confirm the alleged arbitration award and recover alleged lost income. The Complaint served by Plaintiff is devoid of supporting facts and a description of his claims; the summons and complaint are incorrectly headed as a Suffolk Superior Court filing when the case is actually filed in Middlesex County; and the Complaint fails to attach a copy of the alleged arbitration award.

Angelica Corporation: This is a bankruptcy matter as to which MWRA is monitoring developments and determining whether the debtor entity owes MWRA any funds.

Significant Claims There are no Significant Claims.

Army Corps of Engineers v. NSTAR, HEEC and MWRA, C.A No. 16-11470-RGS: On May 24, 2017, a Stipulation agreed to among all parties to the lawsuit was "lodged" with the federal court. The Stipulation includes the substance of the resolution of all claims of all parties concerning the Army Corps allegations that the installed position of the existing cable is not in conformance with the provisions of the Corps' 1989 permit. The Stipulation includes a schedule calling for the placement of a new cable through which electric power will be provided to MWRA's Deer Island facilities along a new route in Boston Harbor, but outside the Reserved Channel, and for the removal of portions of the existing cable to make way for upcoming dredging operations of Massport and the Army Corps. Just prior to the submission of the Stipulation, MWRA entered into an agreement with HEEC regarding MWRA's obligations regarding payment for the new cable following discounts for: (i) the lack of full use of the existing cable by MWRA for its expected remaining useful life, and (ii) for an over-payment made by MWRA to HEEC of the incentive payment for the successful "completion" of the placement of the existing cable allegedly "under budget" per the terms of the 1990 Interconnection Agreement among MWRA, HEEC and NSTAR. The Stipulation has been "lodged" with the federal court for a thirty day public comment period which expired on June 30. In that time frame no adverse comments were received. The Stipulation will be formally accepted by and entered as an Order of the Court which will result in a general stay of the claims of all parties pending full performance of HEEC's obligations with respect to installation of the new cable and removal of portions of the existing cable. MWRA will not be a permittee under a new Army Corps permit for the new cable and will have no responsibility with respect to permitting for or placement or construction of the new cable.

DaPrato v. MWRA, C.A. No. 15-3687-D: On May 22, 2017, after consultation with the Trial Division of the MA Attorney General's Office, MWRA filed a motion with the Superior Court seeking to protect, on behalf of three current MWRA employees, personal information relating to those employees under the MA FIPA statute sought by Plaintiff in connection with the designation of the parties' respective comparator witnesses. The motion was denied upon the ground that comparator witnesses had been sufficiently identified by Plaintiff as comparable to the facts and circumstances surrounding MWRA action taken re: Plaintiff's employment. Plaintiff subsequently took the depositions of three MWRA employees.

Cach, LLC v. Derick Olivar and MWRA: On June 19, 2017, the Court allowed MWRA's motion to dismiss the trustee process action based on Cach, LLC's failure to prosecute and late service of the trustee summons. Cach, LLC had also filed a motion seeking release of the monies withheld from the one-time deduction from the employee's wages after service of the trustee summons. MWRA requested that the Court permit MWRA to return the funds to the employee, under the circumstances. In the Order allowing MWRA's motion, the Court indicated that Cach, LLC was to "take nothing." Law division staff requested that Payroll return the funds withheld to the employee.

Closed Cases Bay State Regional Contractors, Inc., v. MWRA: On May 26, 2017, MWRA entered a settlement in which MWRA agreed to settle claims by Bay State arising out of MWRA's Gillis Pump Station Rehabilitation Project, including claims for alleged extra work and liquidated damages withheld by MWRA due to Bay State's failure to meet contract deadlines. The settlement allowed MWRA to retain out of the liquidated damages all but a small portion of MWRA's costs caused by Bay State's delays.

Subpoenas During the 4th Quarter of FY 2017, two new subpoenas were received, one subpoena was re-activated and one subpoena was pending at the end of the Fourth Quarter FY 2017.

Public Records During the Fourth Quarter of FY 2017, seventeen public records requests were received and ten public records requests were closed.

SUMMARY OF PENDING LITIGATION MATTERS

TYPE OF CASE/MATTER	As of Jun 2017	As of Mar 2017	As of Dec 2016
Construction/Contract/Bid Protest (other than BHP)	0	2	3
Tort/Labor/Employment	3	2	1
Environmental/Regulatory/Other	2	2	2
Eminent Domain/Real Estate	0	0	0
total – all defensive cases	5	6	6
Other Litigation matters (restraining orders, etc.) <u>MWRA v. Thomas Mercer</u> <u>MWRA v. NSTAR and HEEC</u>	2	2	2
total – all pending lawsuits	7	8	8
Claims not in suit: <u>Joel Chiet Claim</u> <u>Besnick Lalaj and Violeta Lalaj Claim</u> <u>Thang Viet Vu and Oanh Vu Claim</u>	3	3	3
Bankruptcy	2	1	1
Wage Garnishment	15	15	14
TRAC/Adjudicatory Appeals	2	3	0
Subpoenas	1	0	0
TOTAL – ALL LITIGATION MATTERS	30	30	26

TRAC/MISC.

New Appeals: One new TRAC appeal was received in the 4th Quarter FY 2017.
Leavitt Corporation; MWRA Docket No. 17-04.

Settlement by Agreement of Parties

Two TRAC Appeals were settled by Agreement of the Parties during the 4th Quarter FY 2017.
Smokehouse, Inc.; MWRA Docket No. 17-01
Constitution Seafoods, Inc.; MWRA Docket No. 17-02

Stipulation of Dismissal

No Stipulation of Dismissals.

Notice of Dismissal Fine paid in full

No cases of Notices of Dismissal, Fine paid in full.

Tentative Decision

No Tentative Decisions were issued in the 4th Quarter FY 17.
No Final Decisions was issued in the 4th Quarter FY 2017.

INTERNAL AUDIT AND CONTRACT AUDIT ACTIVITIES

4th Quarter - FY17

Highlights

During the 4th quarter, Internal Audit (IA) completed a follow-up review of several consultants' vulnerability assessments of MWRA facilities to determine which recommendations have been completed, rejected, or are in the process of being implemented. IA also prepared various analyses including engineering scheduling, thermal overtime and quality assurance/quality control practices of certain consultant firms. A project on the Affirmative Action and Compliance Unit's data visualization was completed.

The HEEC 2016 true-up was completed, and support was provided in the negotiations for a new cable. In addition, 2 consultant preliminary reports were issued and 3 construction labor burden reviews were conducted. The BWSC 2016 force account costs were audited under terms of the memorandum of understanding and financial assistance agreement and a review of the Viscom contract was completed.

Status of Recommendations

IA made 40 recommendations made in FY17 of which 19 have closed. An additional 31 recommendations from prior fiscal year audits were also closed.

IA follows-up on open recommendations on a continuous basis. All open recommendations have target dates for implementation. When a recommendation has not been implemented within 48 months, the appropriateness of the recommendation is re-evaluated during a subsequent audit. On closed assignments 98% of recommendations have been implemented.

Report Title (issue date)	Audit Recommendations		
	Open	Closed	Total
Follow-Up Report on Fleet Services Activities (12/31/13)	1	16	17
Records Management (12/5/14)	1	7	8
Unmatched Receipts and Accruals (6/30/15)	3	7	10
Warehouse Cycle Counts at DITP (11/5/15), Southboro (11/6/15) and Chelsea (12/4/15)	3	22	25
MIS Mobile Equipment Asset Tracking (9/26/16)	1	11	12
Wright Express (WEX) Fuel Card Purchases (11/16/16)	10	3	13
Purchase Card Activity on Deer Island (3/31/17)	10	5	15
Totals	29	71	100

Cost Savings

IA's target is to achieve at least \$1 million in cost savings each year. Cost savings vary each year based upon many factors. In some cases, cost savings for one year may be the result of work in prior years.

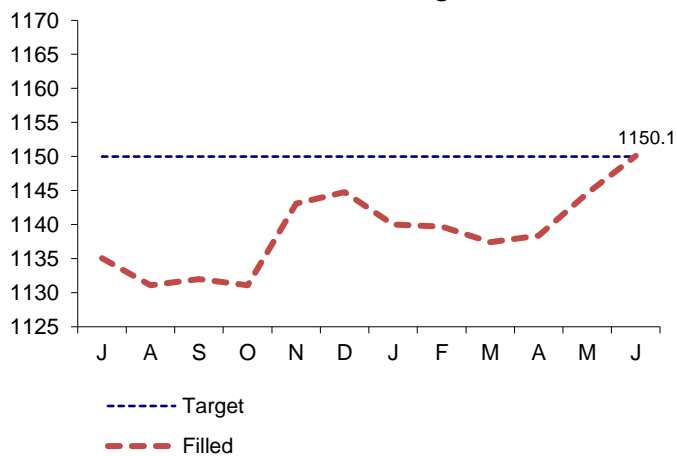
Cost Savings	FY13	FY14	FY15	FY16	FY17	TOTAL
Consultants	\$587,314	\$294,225	\$87,605	\$88,312	\$272,431	\$1,329,887
Contractors & Vendors	\$2,153,688	\$415,931	\$1,146,742	\$1,772,422	\$3,037,712	\$8,526,495
Internal Audits	\$391,083	\$923,370	\$543,471	\$220,929	\$224,178	\$2,303,031
Total	\$3,132,085	\$1,633,526	\$1,777,818	\$2,081,663	\$3,534,321	\$12,159,413

OTHER MANAGEMENT

Workforce Management

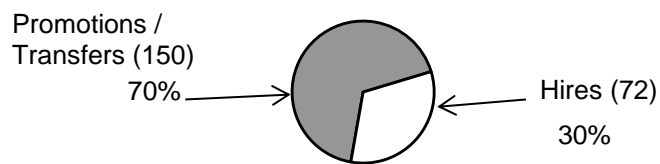
4th Quarter FY17

FTE Tracking



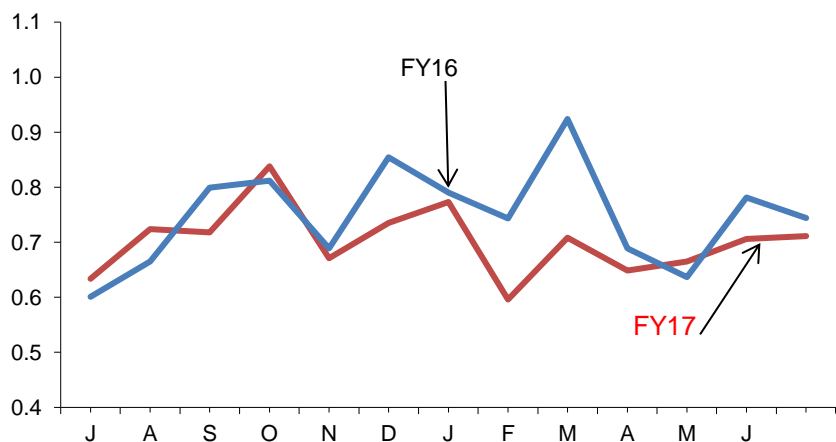
FY17 Target for FTE's = 1150
FTE's as of June 2017 = 1150.1

Positions Filled by Hires/Promotions
FY17-YTD



	Pr/Trns	Hires	Total
FY14	111 (69%)	51 (31%)	162
FY15	133 (67%)	65 (33%)	198
FY16	99 (62%)	60 (38%)	159
FY17	150 (70%)	72 (32%)	222

Average Monthly Sick Leave Usage
Per Employee



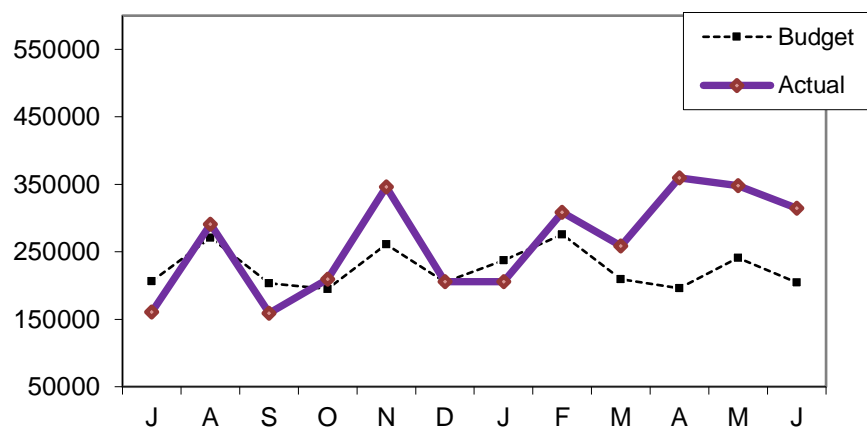
Average monthly sick leave for the 4th Quarter of FY17 decreased as compared to the 4th Quarter of FY16 (8.43 to 8.08 days)

In Q4 of FY17, the average quarterly sick leave usage decreased 7% from the same time last year.

	Number of Employees	YTD	Annualized Total	Annual FMLA %	FY16
Admin	136	7.75	7.75	14.7%	8.29
Aff. Action	4	6.29	6.29	0.0%	8.05
Executive	5	13.80	13.80	48.1%	10.97
Finance	36	8.50	8.50	30.1%	9.70
Int. Audit	7	6.51	6.51	52.6%	4.44
Law	14	8.98	8.98	8.9%	11.41
OEP	8	5.74	5.74	25.3%	6.62
Operations	942	8.55	8.55	16.2%	9.06
Pub. Affs.	13	6.31	6.31	15.2%	9.16
MWRA Avg	1165	8.42	8.42	16.7%	8.99

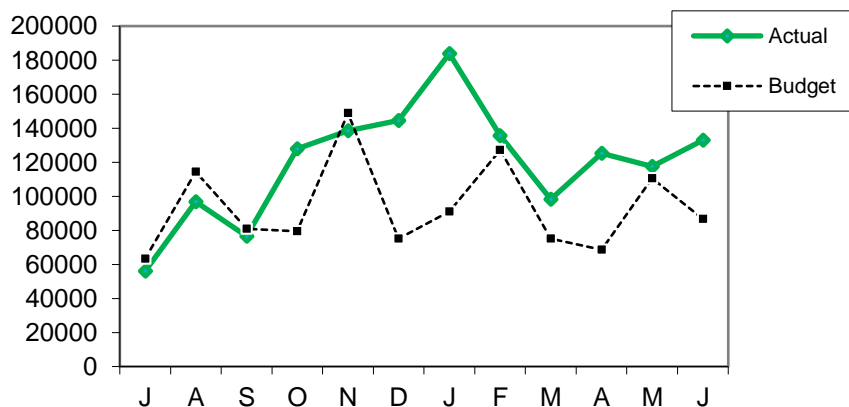
Percent of sick leave usage for FY17, attributable to Family and Medical Leave Act (FMLA) is 16.7% .

Field Operations
Current Month Overtime \$



Total Overtime for Field Operations for the fourth quarter of FY2017 was \$1,022,253 which is \$381k over budget. Emergency overtime was \$584k, which was \$294k over budget. Rain events totaled \$409k, emergency maintenance was \$77k, emergency operations was \$34k. Coverage overtime was \$176k, which was \$42k over budget, reflecting the month's shift coverage requirements. Planned overtime was \$262k or \$45k over budget. Spending for the month includes maintenance off-hours work at \$109k, planned operations at \$35k, and maintenance work completion at \$35k. YTD, FOD has spent \$3,166,726 on overtime which is \$462k over budget.

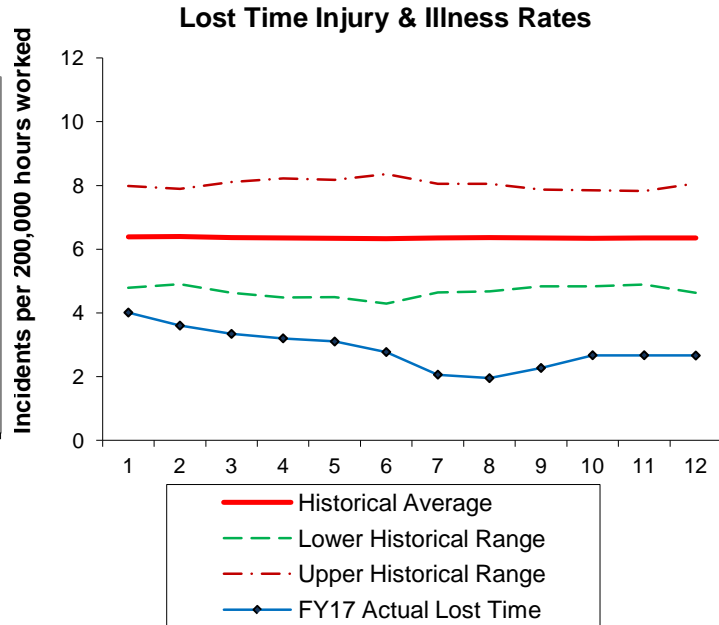
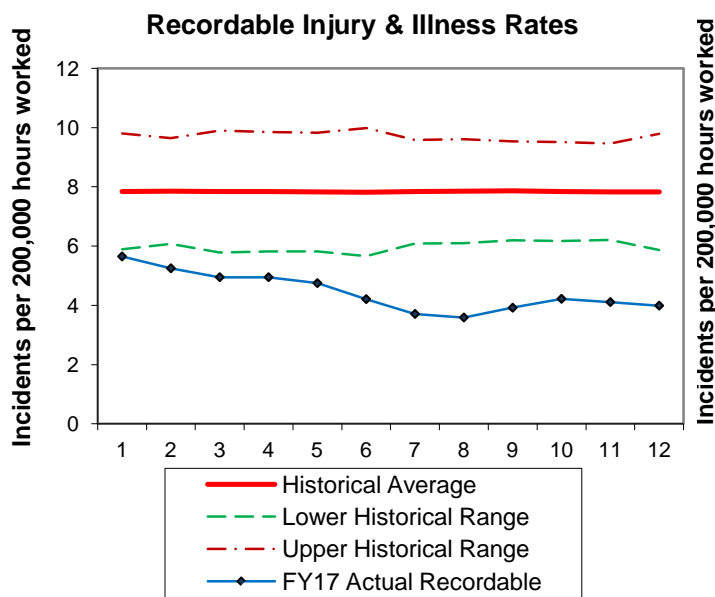
Deer Island Treatment Plant
Current Month Overtime \$



Total overtime for Deer Island for the fourth quarter of FY17 was \$376K, which was \$110K over budget. A combination of planned/unplanned overtime which was \$55K over budget mainly due to maintenance and operations activities involving the Sail Boston event and higher shift coverage overtime, \$63K over budget, due to a 2nd Class Engineer on IA and several vacant operator positions. This is offset in part by, less than anticipated storm coverage overtime, (\$8K). YTD, Deer Island has spent \$1,433,753 on overtime which is \$313K over budget.

Workplace Safety

4th Quarter - FY17



- 1 "Recordable" incidents are all work-related injuries and illnesses which result in death, loss of consciousness, restriction of work or motion, transfer to another job, or require medical treatment beyond first aid.
- 2 "Lost-time" incidents, a subset of the recordable incidents, are only those incidents resulting in any days away from work, days of restricted work activity or both - beyond the first day of injury or onset of illness.
- 3 The "Historical Average" is computed using the actual MWRA monthly incident rates for FY99 through FY14. The "Upper" and "Lower Historical Ranges" are computed using these same data – adding and subtracting two standard deviations respectively. FY15 actual incident rates can be expected to fall within this historical range.

WORKERS COMPENSATION HIGHLIGHTS

	4th Quarter Information		Open Claims
	New	Closed	
Lost Time	6	15	58
Medical Only	9	30	14
Report Only	40	40	
	QYTD		FYTD
Regular Duty Returns	3		21
Light Duty Returns	0		6

COMMENTS:

Regular Duty Returns

APRIL One employee returned to regular duty from IA

MAY One employee returned to regular duty from IA

JUNE One employee returned to regular duty from IA

Light Duty Returns

APRIL No employees returned to light duty from IA

MAY No employees returned to light duty from IA

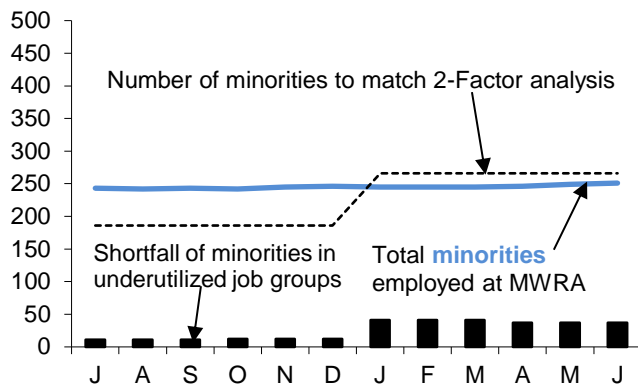
JUNE No employees returned to light duty from IA

Note: Claims may initially be counted in one category and changed to another category at a later date. Examples include a medical treatment only claim (no lost time from work) but the employee may require surgery at a later date resulting in the claim becoming a lost time claim. At that time we would only count the claim as opened but not as a new claim.

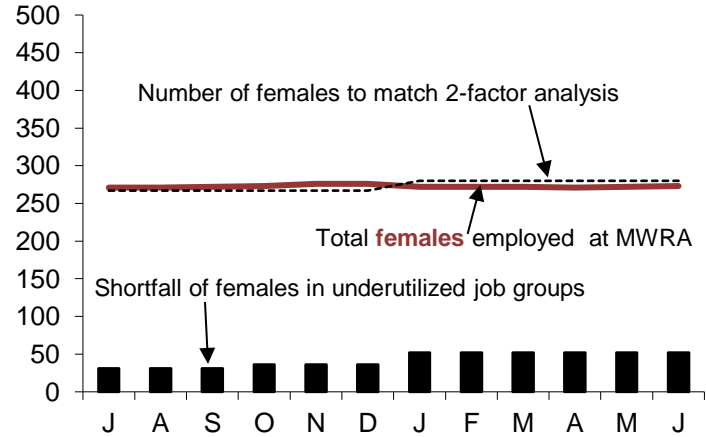
*Report only claims are closed the month they are filed.

MWRA Job Group Representation 4th Quarter - FY17

Minority - Affirmative Action Plan Goals



Female - Affirmative Action Plan Goals



Highlights:

At the end of Q4 FY17, 7 job groups or a total of 37 positions are underutilized by minorities as compared to 6 job groups or a total of 12 positions at the end of Q4 FY16; for females 7 job groups or a total of 52 positions are underutilized by females as compared to 9 job groups or a total of 36 positions at the end of Q4 FY16. During Q4, 1 minority and 4 females were hired. During this same period 1 minorities and 4 females terminated.

Underutilized Job Groups - Workforce Representation

Job Group	Employees	Minorities	Achievement Level	Minority	Females	Achievement Level	Female
	as of 6/30/2017	as of 6/30/2017		Over or Under Underutilized	As of 6/30/2017		Over or Under Underutilized
Administrator A	21	2	2	0	6	6	0
Administrator B	19	1	3	-2	4	6	-2
Clerical A	34	13	9	4	15	32	-17
Clerical B	27	7	7	0	8	15	-7
Engineer A	80	23	18	5	16	12	4
Engineer B	58	16	13	3	6	7	-1
Craft A	113	18	27	-9	8	7	1
Craft B	147	29	32	-3	8	4	4
Laborer	70	21	16	5	3	3	0
Management A	100	15	25	-10	41	25	16
Management B	47	9	7	2	6	12	-6
Operator A	68	4	11	-7	3	9	-6
Operator B	65	13	13	0	18	1	17
Professional A	33	5	7	-2	15	14	1
Professional B	164	45	43	2	54	67	-13
Para Professional	60	18	22	-4	52	32	20
Technical A	53	11	11	0	12	10	2
Technical B	6	1	1	0	2	2	0
Total	1165	251	267	21/-37	277	264	65/-52

AACU Candidate Referrals for Underutilized Positions

Job Group	Title	# of Vac	Requisition Int. / Ext.	Promotions /Transfers	AACU Ref. External	Position Status
Administrator B	Associate General Counsel, Litigation	1	Int/Ext	0	0	NH = WF
Craft A	M&O Specialist	1	Int/Ext	0	2	NH = WM
Craft B	Construction Pipelayer	1	Int	0	0	Promo = WM
Craft B	Heavy Equipment Operator I	1	Int/Ext	0	0	NH = WM
Craft B	HVAC Specialist	1	Int	1	0	Transfer = WM
Craft B	Facilities Specialist	2	Int	2	0	(2) Promo = WM
Craft B	Instrumentation Specialist	1	Int/Ext	0	0	NH = WM
Clerical A	Payables Coordinator	2	Int/Ext	0	0	NH = BF & WM
Clerical A	Secretary I	1	Int/Ext	0	0	NH = HF
Clerical A	Administrative Coordinator	1	Int/Ext	0	1	NH = BF
Clerical B	Warehouse Materials Handler	2	Int	2	0	(2) Promo = HM
Engineer A	Program Manager	1	Int/Ext	0	0	NH = WF
Engineer A	Mechanical Designer	1	Int/Ext	0	0	NH = HM
Engineer A	Project Engineer	1	Int	1	0	Promo = WM
Laborers	Buildings & Grounds Worker	2	Int/Ext	0	0	NH = HM & WM
Laborers	OMC Laborer	2	Int/Ext	0	0	(2) = WM
Management A	Deputy Contracts Manager	1	Int/Ext	0	0	NH = AM
Operator A	Area Supervisor	1	Int	1	0	Promo = WM
Operator B	Operator	2	Int/Ext	0	0	(2) NH = WM
Professional B	Sampling Associate	1	Int	1	0	Promo = WM
Professional B	Sr. Sampling Associate	1	Int	1	0	Promo = WF

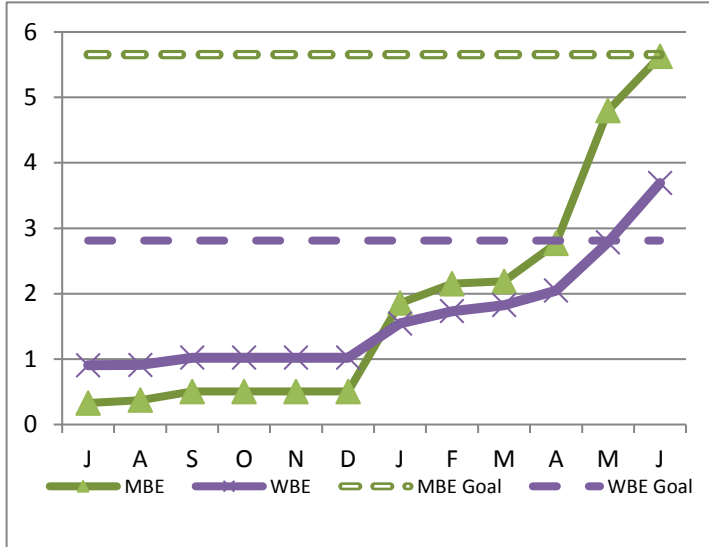
MBE/WBE Expenditures

4th Quarter - FY17

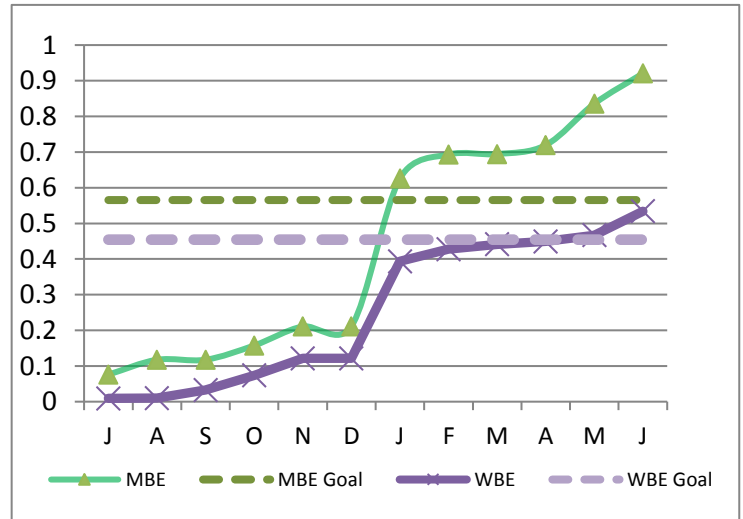
MBE/WBE targets are determined based on annual MWRA expenditure forecasts in the procurement categories noted below. The goals for FY17 are based on 85% of the total construction and 75% of the total professional projected spending for the year. Certain projects have been excluded from the goals as they have no MBE/WBE spending goals.

MBE/WBE percentages are the results from a 2002 Availability Analysis, and MassDEP's Availability Analysis. As a result of the Availability Analyses, the category of Non-Professional Services is included in Goods/Services. Consistent with contractor reporting requirements, MBE/WBE expenditure data is available through June.

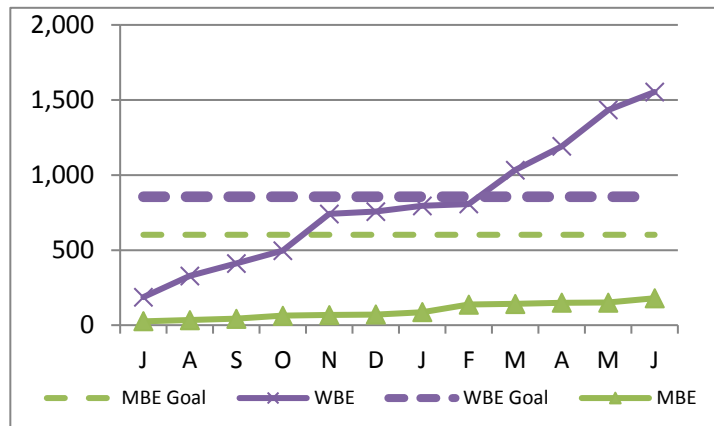
Construction



Professional Services



Goods/Services



FY17 spending and percentage of goals achieved, as well as FY16 performance are as follows:

MBE			
FY17 YTD		FY16	
Amount	Percent	Amount	Percent
5,628,738	99.5%	1,805,604	37.9%
920,597	162.8%	828,841	55.3%
179,359	29.8%	255,324	40.6%
6,728,694	98.6%	2,889,769	41.9%

WBE			
FY17 YTD		FY16	
Amount	Percent	Amount	Percent
3,690,334	131.3%	1,114,916	47.1%
533,917	117.5%	314,752	26.1%
1,553,214	181.6%	1,124,374	160.7%
5,777,465	140.2%	2,554,042	59.8%

Construction
Prof Svcs
Goods/Svcs
Totals

FY16 MBE/WBE dollar totals do not include MBE and WBE payments to prime contractors and consultants.

MWRA FY17 CEB Expenses 4th Quarter - FY17

	June 2017 Year-to-Date (\$000)					
	Budget	Actual	Variance	%	FY17 Budget	%
EXPENSES						
WAGES AND SALARIES	\$ 101,859	\$ 98,494	\$ (3,365)	-3.3%	\$ 101,859	96.7%
OVERTIME	4,193	4,952	759	18.1%	4,193	118.1%
FRINGE BENEFITS	20,242	19,624	(619)	-3.1%	20,242	96.9%
WORKERS' COMPENSATION	2,344	2,565	221	9.4%	2,344	109.4%
CHEMICALS	9,110	9,263	152	1.7%	9,110	101.7%
ENERGY AND UTILITIES	21,541	20,250	(1,291)	-6.0%	21,541	94.0%
MAINTENANCE	31,081	30,799	(282)	-0.9%	31,081	99.1%
TRAINING AND MEETINGS	435	360	(75)	-17.3%	435	82.7%
PROFESSIONAL SERVICES	6,532	6,699	167	2.6%	6,532	102.6%
OTHER MATERIALS	6,220	5,851	(368)	-5.9%	6,220	94.1%
OTHER SERVICES	22,975	21,865	(1,109)	-4.8%	22,975	95.2%
TOTAL DIRECT EXPENSES	\$ 226,532	\$ 220,722	\$ (5,810)	-2.6%	\$ 226,532	97.4%
INSURANCE	\$ 1,998	\$ 1,740	\$ (258)	-12.9%	\$ 1,998	87.1%
WATERSHED/PILOT	24,291	23,912	(380)	-1.6%	24,291	98.4%
BECo PAYMENT	774	789	15	2.0%	774	102.0%
MITIGATION	1,558	1,543	(15)	-1.0%	1,558	99.0%
ADDITIONS TO RESERVES	(168)	(168)	-	0.0%	(168)	100.0%
RETIREMENT FUND	4,633	4,633	-	0.0%	4,633	100.0%
POST EMPLOYEE BENEFITS	4,876	4,876	-	0.0%	4,876	100.0%
TOTAL INDIRECT EXPENSES	\$ 37,962	\$ 37,324	\$ (638)	-1.7%	\$ 37,962	98.3%
STATE REVOLVING FUND	\$ 86,972	\$ 80,460	\$ (6,512)	-7.5%	\$ 86,972	92.5%
SENIOR DEBT	268,473	287,932	19,459	7.2%	268,473	107.2%
CORD FUND	-	-	-	-	-	-
DEBT SERVICE ASSISTANCE	(874)	(1,265)	(392)	-44.8%	(874)	69.1%
CURRENT REVENUE/CAPITAL	12,200	12,200	-	0.0%	12,200	100.0%
SUBORDINATE MWRA DEBT	69,998	69,998	-	0.0%	69,998	100.0%
LOCAL WATER PIPELINE CP	4,149	859	(3,291)	-79.3%	4,149	20.7%
CAPITAL LEASE	3,217	3,217	-	0.0%	3,217	100.0%
DEBT PREPAYMENT	10,995	10,995	-	0.0%	10,995	100.0%
VARIABLE DEBT	-	(11,028)	(11,028)	-	-	0.0%
DEFEASANCE ACCOUNT	-	-	-	-	-	-
TOTAL DEBT SERVICE	\$ 455,130	\$ 453,367	\$ (1,763)	-0.4%	\$ 455,130	99.6%
TOTAL EXPENSES	\$ 719,624	\$ 711,413	\$ (8,211)	-1.1%	\$ 719,624	98.9%
REVENUE & INCOME						
RATE REVENUE	\$ 694,879	\$ 694,879	\$ -	0.0%	\$ 694,879	100.0%
OTHER USER CHARGES	8,753	8,809	57	0.6%	8,753	100.6%
OTHER REVENUE	6,519	13,088	6,569	100.8%	6,519	200.8%
RATE STABILIZATION	-	-	-	-	-	-
INVESTMENT INCOME	9,473	9,758	285	3.0%	9,473	103.0%
TOTAL REVENUE & INCOME	\$ 719,624	\$ 726,534	\$ 6,910	1.0%	\$ 719,624	101.0%

As of June 2017, total expenses are \$711.4 million, \$8.2 million or 1.1% lower than budget, and total revenue is \$726.5 million, \$6.9 million or 1.0% over budget, for a net variance of \$15.1 million.

Expenses –

Direct Expenses are \$220.7 million, \$5.8 million or 2.6% below budget.

- **Wages & Salaries** are under budget by \$3.4 million or 3.3%. At the end of June, the average Full Time Equivalent (FTE) positions were 1,139, 11 positions fewer than the 1,150 FTE's budgeted.
- **Utilities** are under budget by \$1.3 million or 6.0% due to lower than budgeted electricity costs of \$1.5 million at Deer Island, reflecting both lower electricity prices and reduced purchased electricity during the HEEC cable location work by Eversource partially offset by additional diesel purchases of \$380k also related to operation of the CTGs during the detection of the HEEC cable location project.
- **Other Services** are under budget by \$1.1 million or 4.8% due to lower Sludge Pelletization expenses of \$418k reflecting lower year to date quantities, lower Lease/Rentals of \$219k due to lower escrow payments at the Chelsea Facility for taxes and insurance, and lower pass through maintenance cost at the Charlestown Navy Yard Facility, \$207k for Other Services, and \$95k for Grit and Screenings disposal services due to lower quantities.
- **Overtime** expenses are higher than budgeted by \$759k or 18.1% mainly at the Deer Island Treatment Plant for the HEEC cable location project by Eversource and for off-hours maintenance projects primarily for Field Operations Metro Maintenance.
- **Fringe Benefits** are under budget by \$619k or 3.1% mainly due to fewer than budgeted participants.
- **Other Materials** expenses are \$368k under budget due to underspending for vehicle expense \$268k reflecting lower fuel prices and lower than budgeted computer hardware expenses of \$255k, offset by higher than budgeted spending of \$119k for lab and testing supplies.
- **Ongoing Maintenance** expenses are \$282k under budget, less than 1% for the fiscal year.
- **Professional Services** were higher than budget by \$167k or 2.6% due primarily to the HEEC Cable relocation work.

Indirect Expenses are \$37.3 million, \$638k under budget or 1.7%. Insurance Claims and Watershed Reimbursements/PILOT are under budget by \$254k and \$380k, respectively.

Debt Service Expenses totaled \$453.4 million, \$1.8 million under budget after the transfer of the \$20.1 million favorable variance to the Defeasance account. Variable rate savings accounted for \$11.0 million. MWRA also recognized \$6.5 million in YTD underspending due to the favorable impact of the August 2016 defeasance, lower SRF funding, and no senior debt borrowing in January.

Revenue and Income –

Total Revenue / Income is \$726.5 million, \$6.9 million higher than budget, primarily for non-rate revenue including \$4.8 million for water usage related to the summer drought, \$1.1 million for Nut Island fire insurance proceeds, \$299k for a class action lawsuit settlement for derivative agreements, \$528k for the disposal of surplus materials, and \$324k for energy efficiency incentives. Investment Income is over budget by a net \$285k as a result of higher short term interest rates offset for unanticipated calls re-invested at lower rates.

Cost of Debt

4th Quarter - FY17

MWRA borrowing costs are a function of the fixed and variable tax exempt interest rate environment, the level of MWRA's variable interest rate exposure and the perceived creditworthiness of MWRA. Each of these factors has contributed to decreased MWRA borrowing costs since 1990.

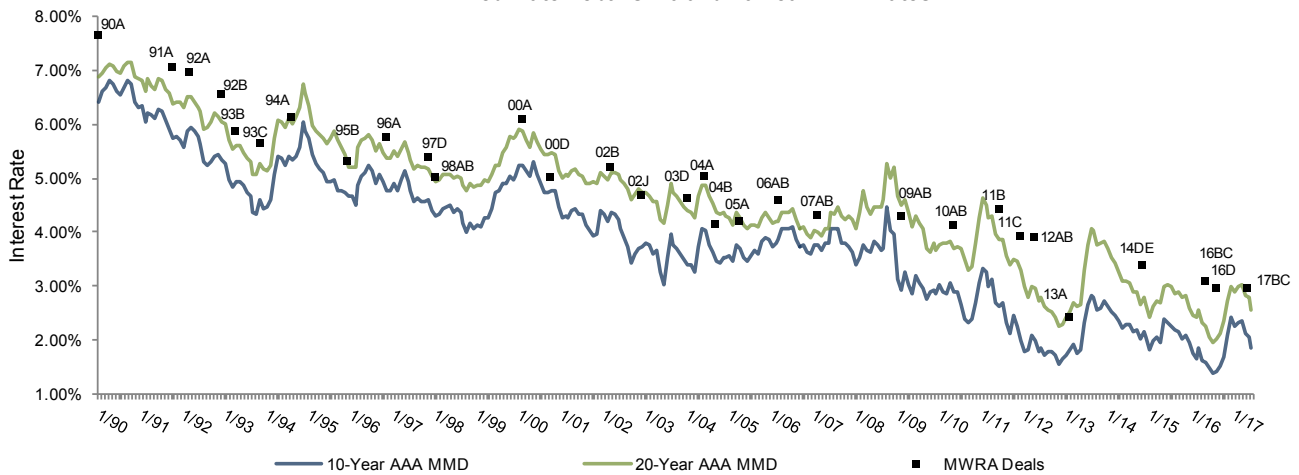
Average Cost of MWRA Debt FYTD

Fixed Debt (\$3,605)	3.82%
Variable Debt (\$481.2)	1.08%
SRF Debt (\$1,007)	1.41%
 Weighted Average Debt Cost (\$5,093)	 3.08%

Most Recent Senior Fixed Debt Issue May 2017

2017 Series B & C (\$322.9)	2.98%
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MWRA Fixed Rate Debt vs. 10 and 20 Year MMD Rates

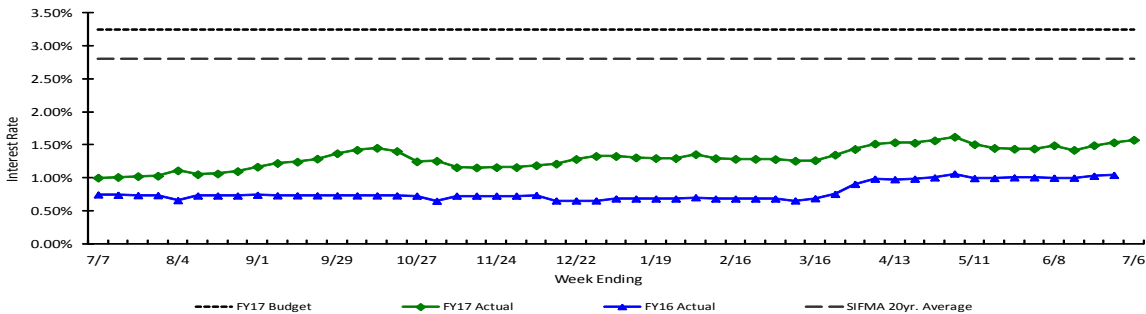


Bond Deal	1992B	1993B	1993C	1994A	1995B	1996A	1997D	1998AB	2000A	2000D	2002B	2002J	2003D	2004A
Rate	6.58%	5.89%	5.66%	6.15%	5.34%	5.78%	5.40%	5.04%	6.11%	5.03%	5.23%	4.71%	4.64%	5.05%
Avg Life	6.3 yrs	19.8 yrs	19.1 yrs	19.5 yrs	20.5 yrs	19.5 yrs	21.6 yrs	24.4 yrs	26.3 yrs	9.8 yrs	19.9 yrs	19.6 yrs	18.4 yrs	19.6 yrs

Bond Deal	2004B	2005A	2006AB	2007AB	2009AB	2010AB	2011B	2011C	2012AB	2013A	2014DEF	2016BC	2016D	2017BC
Rate	4.17%	4.22%	4.61%	4.34%	4.32%	4.14%	4.45%	3.95%	3.93%	2.45%	3.41%	3.12%	2.99%	2.98%
Avg Life	13.5 yrs	18.4 yrs	25.9 yrs	24.4 yrs	15.4 yrs	16.4 yrs	18.8 yrs	16.5 yrs	17.9 yrs	9.9 yrs	15.1 yrs	17.4 yrs	18.8yrs	11.2 yrs

Weekly Average Variable Interest Rates vs. Budget

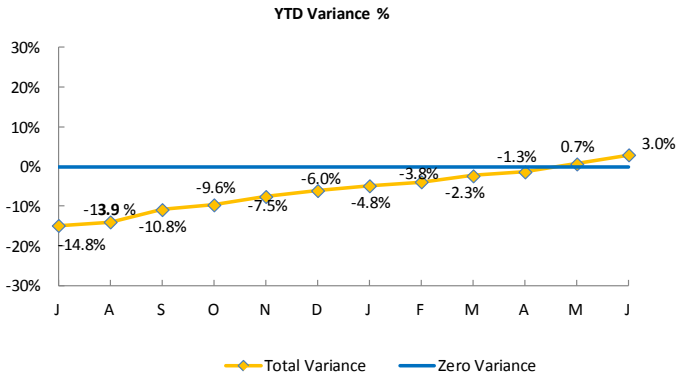
MWRA currently has eleven variable rate debt issues with \$903 million outstanding, excluding commercial paper. Of the eleven outstanding series, five have portions which have been swapped to fixed rate. Variable rate debt has been less expensive than fixed rate debt in recent years as short-term rates have remained lower than long-term rates on MWRA debt issues. In June, SIFMA rates ranged from a high of 0.87% to a low of 0.74% for the month. MWRA's issuance of variable rate debt, although consistently less expensive in recent years, results in exposure to additional interest rate risk as compared to fixed rate debt.



Investment Income

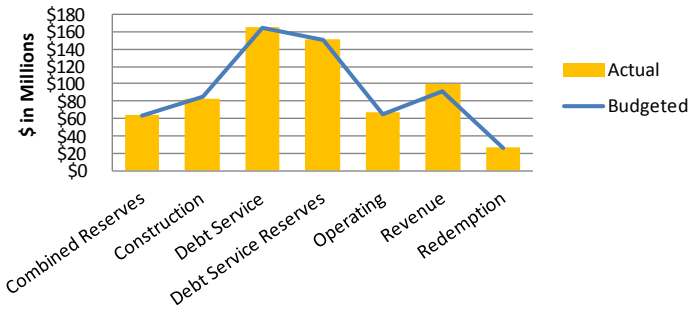
4th Quarter – FY17

Year To Date

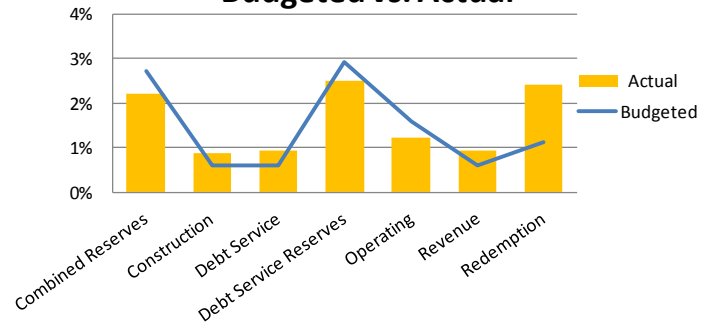


	YTD BUDGET VARIANCE			
	(\$000)			
	BALANCES IMPACT	RATES IMPACT	TOTAL	%
Combined Reserves	(\$0)	(\$308)	(308)	-17.9%
Construction	(\$19)	\$229	210	41.1%
Debt Service	\$6	\$561	567	57.7%
Debt Service Reserves	\$16	(\$624)	(608)	-13.9%
Operating	\$24	(\$364)	(339)	-33.0%
Revenue	\$40	\$386	427	77.3%
Redemption	(\$0)	\$338	337	113.3%
Total Variance	\$67	\$218	\$285	3.0%

YTD Average Balances Budgeted vs. Actual

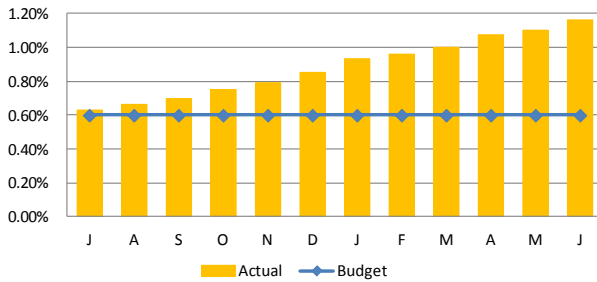


YTD Average Interest Rate Budgeted vs. Actual

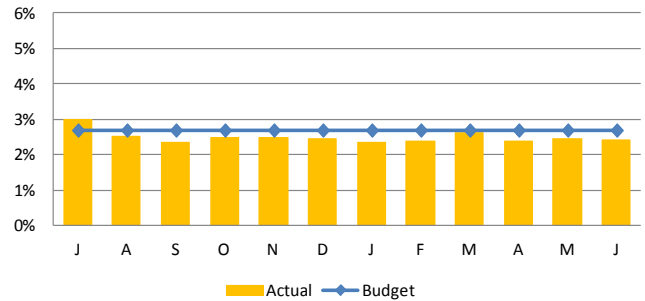


Monthly

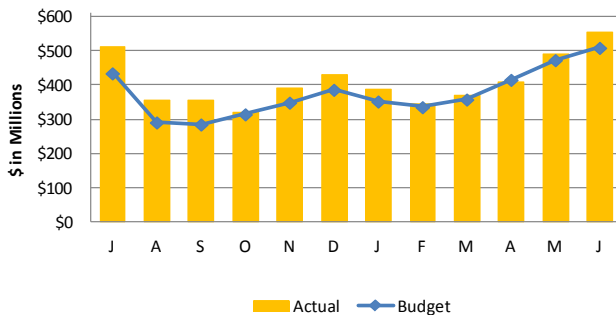
Short-Term Interest Rates



Long-Term Interest Rates



Short-Term Average Balances



Long-Term Average Balances

