

MASSACHUSETTS WATER RESOURCES AUTHORITY

**Board of Directors Report**  
On  
**Key Indicators of MWRA Performance**  
For  
Second Quarter FY2017

Q1	Q2	Q3	Q4



Frederick A. Laskey, Executive Director  
Michael J. Hornbrook, Chief Operating Officer  
February 15, 2017

# Board of Directors Report on Key Indicators of MWRA Performance

## Second Quarter FY17

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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.

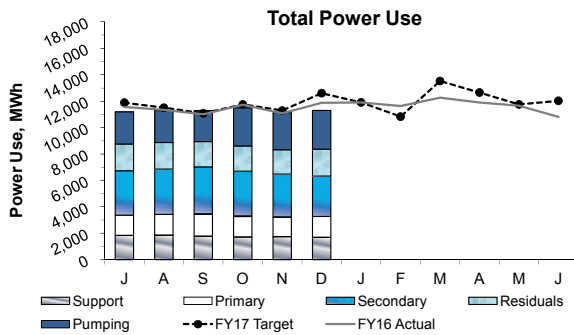
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# OPERATIONS AND MAINTENANCE

# Deer Island Operations

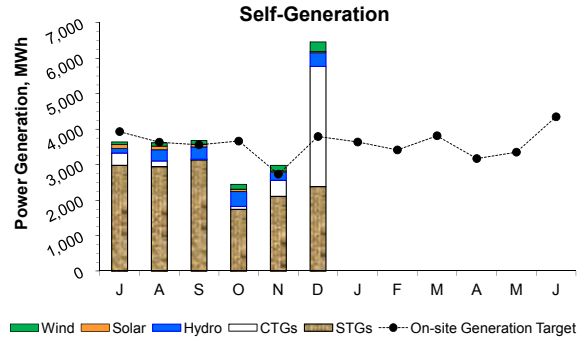
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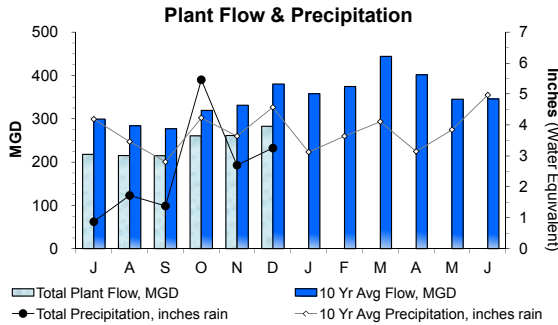
Total power usage in the 2nd Quarter was 4.9% below target as Total Plant Flow was 10.7% below target with the 3 year average plant flow. Power usage throughout the plant has been at our below target for the entire quarter.

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

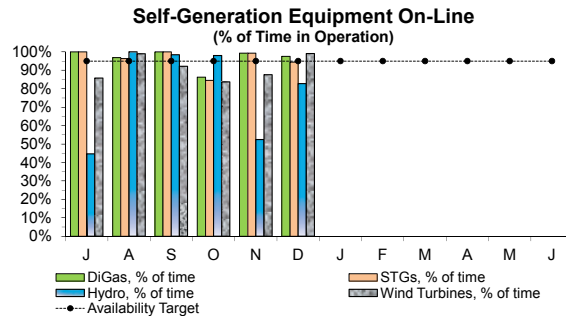


Power generated on-site during the 2nd Quarter was 16.6% above target. While generation by the Solar Panels and Wind Turbines exceeded their targets, generation by the STGs was below target due to scheduled annual maintenance in October and generation by the Hydro Turbines was below target due to mechanical issues and lower than expected plant flow. The CTGs generated significantly more power than expected during the quarter as the CTGs were operated for extended periods of time in November and December as DITP was taken off utility power to allow Eversource to de-energize the cross-harbor power cable in order to perform cable location work in the Reserved Channel.

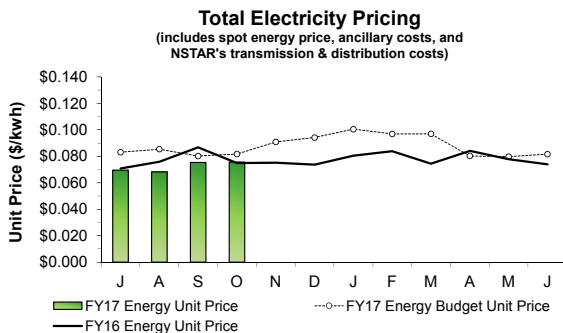
Note: Power generation data for the Solar Panels and the Wind Turbines may be difficult to see as the amount of power generated is low within the current scale of this graph; a total of 135.6 MWh was generated by the Solar Panels and 566.6 MWh was generated by the Wind Turbines in the 2nd Quarter.



Total Plant Flow for the 2nd Quarter was 22.0% below target with the 10 year average plant flow (268.2 MGD actual vs. 343.6 MGD expected) as precipitation for the quarter was 8.3% lower than target (11.41 inches actual vs. 12.44 inches expected).

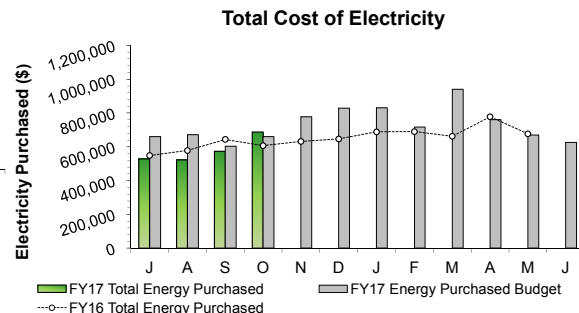


The DiGas system met the 95% availability target for the 2nd Quarter. However, the STGs, fell below target due to scheduled annual maintenance outage of the Thermal Power Plant in October. The Hydro Turbines and Wind Turbines fell below target due to electrical and mechanical issues.



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. The actual Total Energy Unit Price in the 2nd Quarter (actuals for October only) was 7.4% lower 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.

Note: Only the actual energy prices are reported. Therefore, the dataset lags by two (2) month due to the timing of invoice receipt.



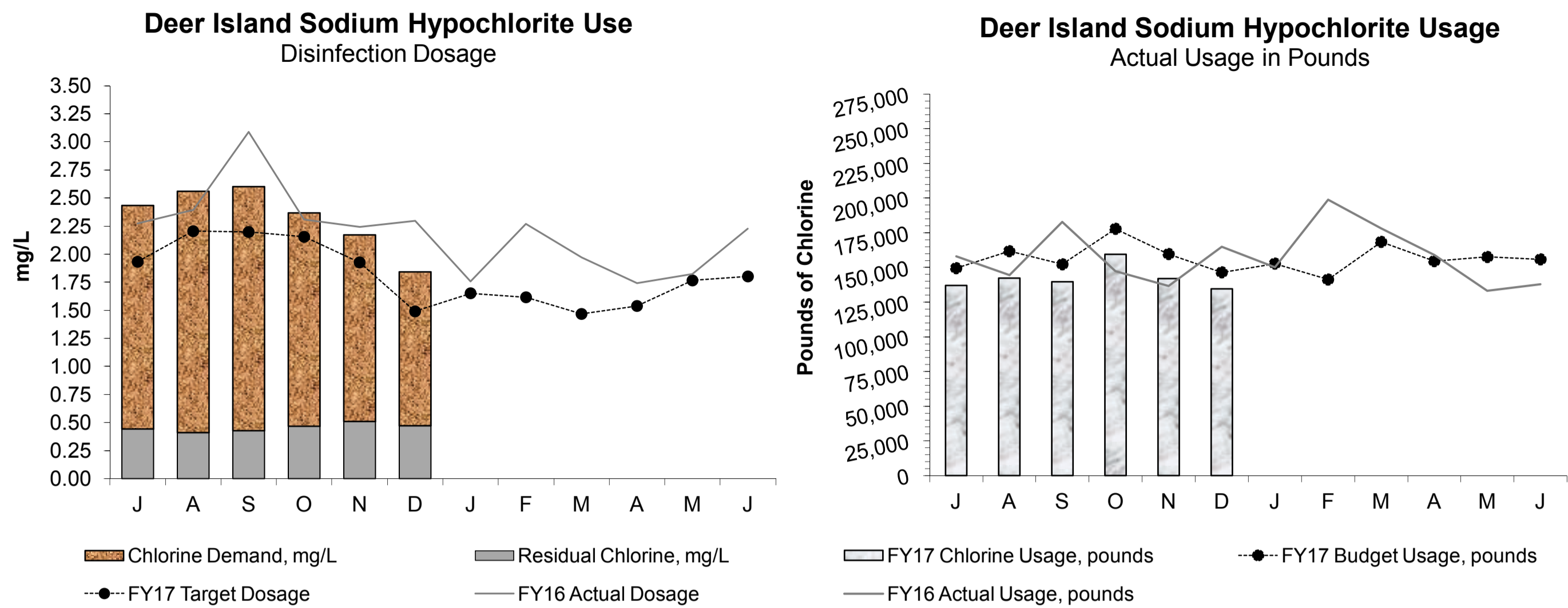
The total cost of Electricity Purchased during the 2nd Quarter (actuals for October only) was 4.1% higher than budget due to higher than expected volume of electricity purchased as a result of lower than expected generation during the month of October. Year-to-date costs however, are \$284,225 lower than budgeted through October as the Total Energy Unit Price is lower than budgeted by 12.6% through October. The cost data for Electricity Purchased in November and December are not yet available as of reporting time.

Note: Only months with complete Electricity Purchased data are reported. Therefore, the dataset lags by two (2) months due to the timing of invoice receipt.

## Deer Island Operations

2nd Quarter - FY17

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The disinfection dosing rate in the 2nd Quarter was 15% higher than the target. DITP maintained an average disinfection chlorine residual of 0.48 mg/L this quarter with an average dosing rate of 2.13 mg/L (as chlorine demand was 1.64 mg/L). Chlorine dosing was higher than expected due to lower than expected plant flow resulting in a higher chlorine demand. However, actual sodium hypochlorite usage in pounds of chlorine was 9.9% below target this quarter.

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					
F					
M					
A					
M					
J					
<b>Total</b>	<b>5</b>	<b>5</b>	<b>0</b>	<b>99.9%</b>	<b>10.74</b>

99.8% of all flows were treated at full secondary during the 2nd Quarter. There were a total of five (5) secondary blending events that were all due to high plant flow resulting from heavy rain. The five (5) combined blending events resulted in a total of 10.74 hours of blending and 57.63 Mgal of flow blended with secondary effluent. The Maximum Secondary Capacity for the entire month was 700 MGD.

Secondary permit limits were met at all times during the 2nd Quarter.

## Deer Island Operations & Maintenance Report

### Environmental/Pumping:

The continued low flows, due mainly to ongoing drought conditions, produced a number of calendar year low flow records for 2016 (since plant startup, July 1998). Precipitation in 2016 was the second lowest post plant startup with a total of 33.05 inches of precipitation. The lowest calendar year total precipitation post plant startup was 31.71 inches set in 2001. The following are the new calendar year low flow records -

- Average Total Plant Flow – 282.34 MGD set in CY16 (previous calendar year record was 295.30 MGD in CY15),
- Average North System Flow – 188.11 MGD set in CY16 (previous calendar year record was 192.62 MGD in CY15),
- Average South System Flow – 94.23 MGD set in CY16 (previous calendar year record was 99.05 MGD in CY12).

The plant achieved a peak flow rate of 959.9 MGD at midnight on October 22 during a rain event that produced 1.34 inches of precipitation. Overall, Total Plant Flow in the 2nd Quarter was 22.0% below the 10 year average plant flow target for the quarter.

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 2. 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 five (5) force main isolation events during the second quarter of FY17, to remove and install the new equipment for Pumps #1 and #4, and to remove the old equipment for Pump #3.

## Deer Island Operations

2nd Quarter - FY17

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### Deer Island Operations & Maintenance Report (continued)

#### Environmental/Pumping (continued):

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 this portion of the work was completed each day.

#### Secondary Treatment:

Annual turnaround maintenance was performed on Train #1 in the Cryogenic Oxygen Facility in mid-October. 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. During this turnaround maintenance, the contractor calibrated all the instrumentation on Cold Box unit #1 as well as, a number of other components of the oxygen plant.

#### Energy and Thermal Power Plant:

Overall, total power generated on-site accounted for 35.1% of Deer Island's total power use for the 2nd Quarter. Renewable power generated on-site (by Solar, Wind, STGs, and Hydro Turbines) accounted for 23.5% of Deer Island's total electrical power use for the quarter.

The annual maintenance at the Thermal Power Plant took place starting on October 2 and continued through October 14. Various maintenance activities on both Steam Turbine Generators (STGs), the two Zurn boilers, and the common systems occurred and involved maintenance on various pumps, valves, and instruments throughout the power plant.

Eversource and its subsidiary Harbor Electric Energy Company ("HEEC") is currently undertaking a project to more precisely locate the depth of the Reserved Channel portion of HEEC's 115kV power line which is used to provide primary power to the DITP. The HEEC project consists of Phase 1 and Phase 2. The first part of Phase 1 consisted of precisely locating the cable in the Reserved Channel, which took place November 2 to November 5 and required DITP to be isolated from the grid and operate using backup CTG power from approximately 6:00 a.m. to 7:00 p.m. each day while the cable was de-energized to safely carry out this work. The second part of Phase 1, which began December 8 and continued into January, involves test pit dredging to verify the location of the cable. The CTGs were operated for various periods of time on 12 days in December for this portion of the work. Phase 2 will involve dredging and installing protective mats over the 1,200 foot section of cable in the Reserved Channel, currently planned for the summer of 2017.

An unanticipated plant-wide power outage occurred at 9:06 a.m. on December 8 as a result of CTG #2 tripping offline while DITP was disconnected from utility power for an Eversource power cable outage. Power was restored within 8 minutes of the outage when CTG #1 was placed into operation. DITP reconnected to the grid (utility power) later in the afternoon once Eversource was able to re-energize the power cable. Staff and the CTG service contractor were able to pinpoint and correct the cause of the issue, and the Eversource cable work resumed on December 13.

#### Regulatory:

Based on the treatment plant's performance in 2016, Deer Island is expected to receive 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 is qualified for a Platinum Award<sup>10</sup> for having operated with no permit violations from 2007 through 2016. Deer Island's last permit violation occurred in August 2006 due to an acute toxicity test result that failed to meet the permit limits.

#### Clinton AWWTP:

Based on the treatment plant's performance in 2016, Clinton Treatment Plant is expected to receive NACWA's (National Association of Clean Water Agencies) Gold Award for Peak Performance which recognizes member agency facilities for compliance of their National Pollutant Discharge Elimination System (NPDES) permit limits. The Gold Award is given to facilities with no NPDES permit violations for the entire calendar year. Clinton Treatment Plant is qualified for its second consecutive Gold Award for having operated with no permit violations in 2015 and 2016.

#### Phosphorus Reduction Facility:

Work completed or in progress during the second quarter: Placed concrete for mix tank outlet channel slab, electric room floor slab, roof deck, girders and beams; installed new plant water line, yard hydrant, and channel slide gates; prepared wet well and applied epoxy base coats; installed floor drains and vent piping in bathroom area; Mason constructed "mock-up" panel; preparing for coatings in rapid mix tank; mobilized and erected staging and enclosure and completed block work; placed waterproofing and commenced exterior brick work.

#### Trickling Filter # 3:

Assembled machined components on trickling filter center column. Crane was used to lift column onto center pedestal. Reattached distribution arms and adjusted support cables to level arms.

#### Outfall Composite Sampler Shed:

Purchased and installed sampling shed for outfall composite samplers. Electricians pulled wiring and instrumentation technician installed flow paced signal splitter to accommodate central lab composite samplers and Toxic Reduction and Control samplers.

#### Removing scale in Soda Ash Feed Line:

Chelsea Vactor truck was used to dispense high pressure water in soda ash line to remove build-up and flush debris from line reducing back pressure to feed pump.

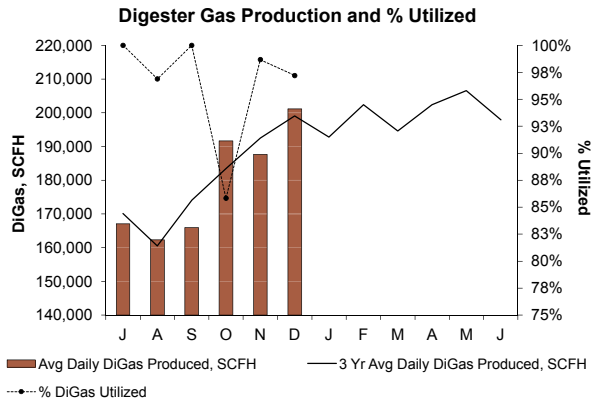
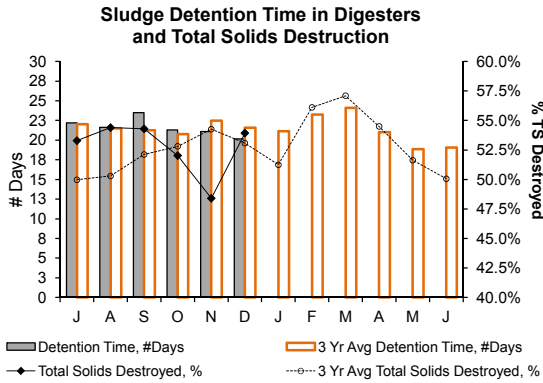
#### Clarifloculator #3:

Replaced 12 existing 4 inch ground water relief valves with new Tideflex EPDM check valves. Valves are used to relieve ground water pressure from the outside of the tank when it is empty.

# Deer Island Operations and Residuals

2nd Quarter - FY17

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Total solids (TS) destruction following anaerobic sludge digestion averaged 51.5% during the 2nd Quarter, lower than the 3 year average of 53.4% for the same period, as the sludge detention time in the digesters was 20.9 days, slightly lower than the 3 year average of 21.6 days. DI operated with an average of 8.0 digesters during the 2nd Quarter in comparison to the 3 year average of 7.8 digesters.

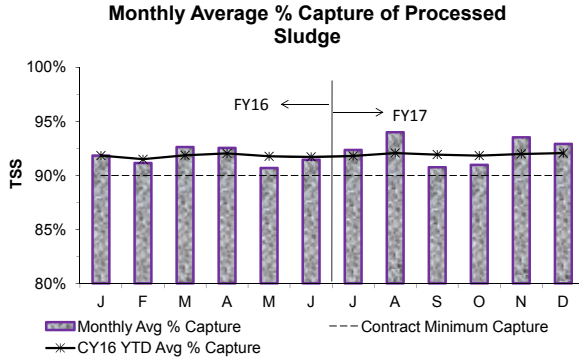
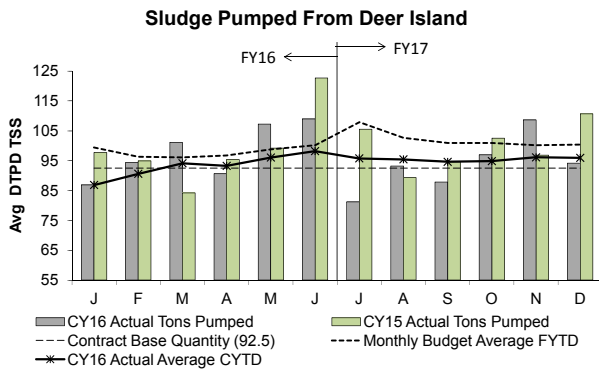
The Avg Daily DiGas Production in the 2nd Quarter was 0.9% above target with the 3 Year Avg Daily DiGas Production for the same period even though sludge production was lower than expected. On average, 93.9% of all the DiGas produced in the quarter was utilized at the Thermal Power Plant. DiGas utilization was a low of 85.8% in October due to a scheduled annual maintenance outage of the Thermal Power Plant.

The lower sludge detention time, and therefore the lower solids destruction, was a result of thinner sludge and a higher sludge volume in November, a side effect of several rain events during the month. Sludge detention times and solids destruction in October and December were more typical based on historical trends.

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.

## 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 (FY16's budget was 100.2 DTPD/TSS and FY17's budget is 100.6 DTPD/TSS).



The average total quantity of sludge pumped to the Pellet Plant in the 2nd Quarter of FY17 was 100.0 DTPD - on target with FY17's average budget of 100.6 DTPD.

The contract requires NEFCo to capture at least 90.0% of the solids delivered to the Biosolids Processing Facility in Quincy. The CY16 average capture is 92.06%.

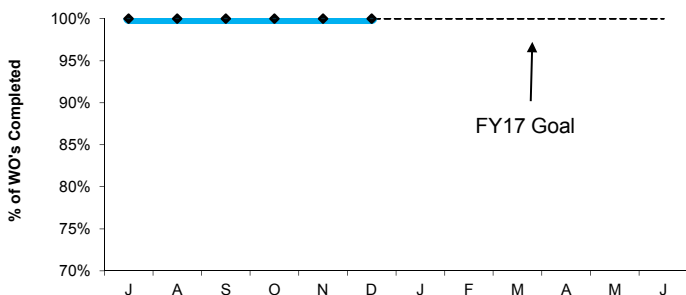
# Deer Island Maintenance

2nd Quarter FY17

## Productivity Initiatives

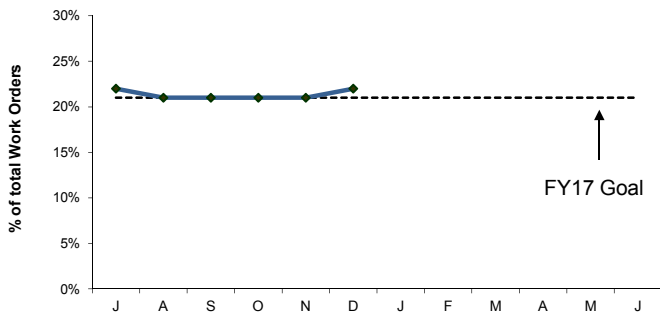
Productivity initiatives include increasing predictive maintenance compliance and increasing PdM work orders. Accomplishing these initiatives should result in a decrease in overall maintenance backlog.

### Predictive Maintenance Compliance



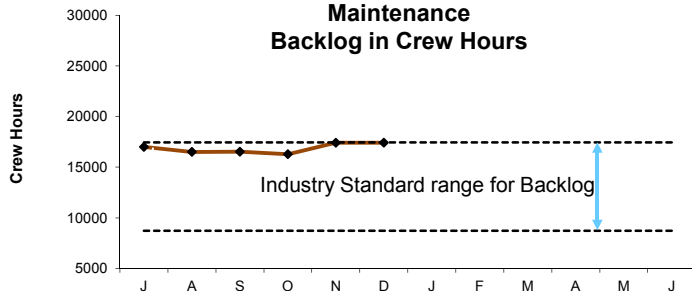
Deer Island's FY17 predictive maintenance goal is 100%. DITP completed 100% of all PdM work orders this quarter. DITP is continuing with an aggressive predictive maintenance program.

### Predictive Maintenance



Deer Island's FY17 predictive maintenance goal is 21% of all work orders to be predictive. 21% of all work orders were predictive maintenance this quarter. The industry is moving toward increasing predictive maintenance work to reduce downtime and better predict when repairs are needed.

### Maintenance Backlog in Crew Hours



DITP's maintenance backlog at Deer Island is 17,043 hours this quarter. DITP is within the industry average for backlog. The industry Standard for maintenance backlog with 97 staff (currently planned staffing levels) is between 8,730 hours and 17,460 hours. Backlog is affected by five vacancies; two M&O Specialists, Instrument Technician, Electrician and a HVAC Specialist. Management continues to monitor backlog and to ensure all critical systems and equipment are available.

## Proactive Initiatives

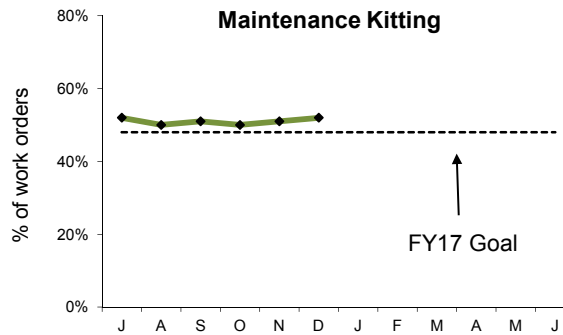
Proactive initiatives include completing 100% of all preventative maintenance tasks and increasing preventative maintenance kitting. These tasks should result in lower maintenance costs.

### Preventative Maintenance Compliance



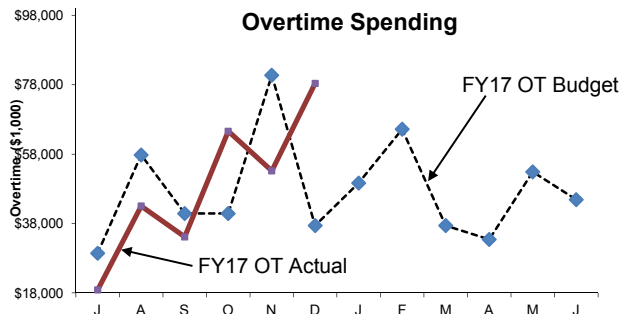
Deer Island's FY17 preventative maintenance goal is 100% completion of all work orders from Operations and Maintenance. DITP completed 100% of all PM work orders this quarter.

### Maintenance Kitting



Deer Island's FY17 maintenance kitting goal is 48% of all work orders to be kitted. 51% of all work orders were kitted this quarter. Kitting is staging of parts or material necessary to complete maintenance work. This has resulted in more wrench time and increased productivity.

### Overtime Spending



Maintenance overtime was over budget by \$20K this quarter and \$22k under for the year. Management continues to monitor backlog and to ensure all critical equipment and systems are available. This quarters overtime was predominately used for Island Wide HVAC work, Eversource Cable Outage, Maintenance Warehouse Heating Coil Replacement, Rebuild Residuals Odor Control Fan #4, and Winthrop Terminal Facility VFD #6.

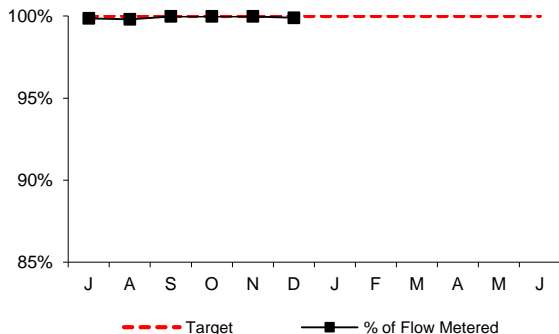


# Operations Division Metering

2nd Quarter - FY17

## WATER METERS

**Percent of Total Revenue Water Deliveries Calculated Using Meters**

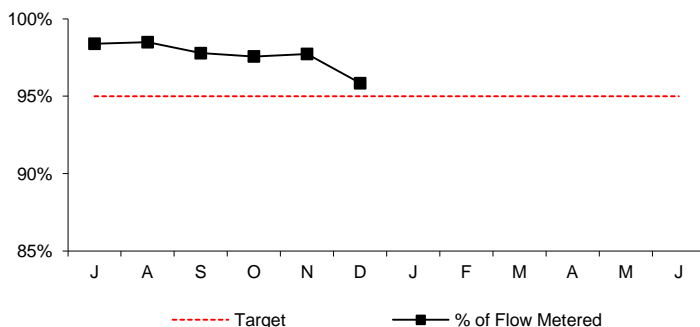


The target for revenue water deliveries calculated using meters is 100%. Estimates are generated for meters that are out of service due to instrumentation problems or in-house and capital construction projects. During the 2nd quarter of FY17, meter actuals accounted for 99.96% of flow; only 0.04% of total revenue water deliveries were estimated. The following is the breakdown of reasons for estimations:

- In-house and Capital Construction Projects - 0.01%
- Instrumentation Failure - 0.03%

## WASTEWATER METERS

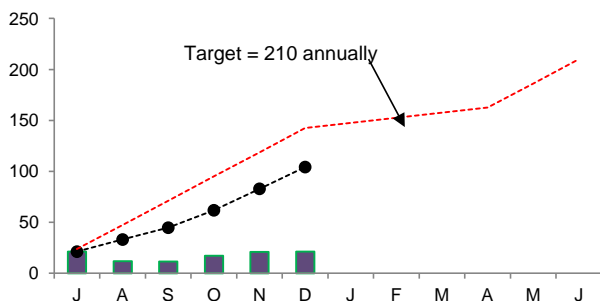
**Percent of Total Wastewater Transport Calculated Using Meters**



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 2nd quarter of FY17, meter actuals accounted for 97.05% of flow; only 2.95% of wastewater transport was estimated.

## WATER DISTRIBUTION SYSTEM PIPELINES

**Miles Surveyed for Leaks**



During the second quarter, 59.49 miles of water mains were inspected. The total inspected for the fiscal year to date is 104.22 miles. Miles surveyed is below target due to training of new staff.

**Leak Backlog Summary**

Month	J	A	S	O	N	D	J	F	M	A	M	J
Leaks Detect	3	2	2	3	3	0						
Leaks Repair	1	1	1	4	2	2						
Backlog	7	8	9	8	9	7						
Avg. Lag Tim	24.9	42.3	36.7	41.3	45.2	58.6						

During the second quarter, six new leaks were detected. All six leaks detected during the second quarter were repaired, as well as one detected in June and one in July. Refer to FY17 Leak Report below for details. Also, community service ranging from individual leak location to hydrant surveys were conducted for: Arlington, Boston, Malden, Medford, Milton, Lynn, Newton, Somerville, and Waltham.

### FY17 Leak Report as of 2nd Q FY17

Date Detected	Location of Leaks	Repaired
7/22/2016	69 Riverside Avenue, Medford	7/29/2016
1/11/2015	Arborway @ St. Joseph St., West Roxbury	8/15/2016
9/15/2016	West Squantum @ Amsterdam Ave., Quincy	9/20/2016
10/12/2016	Prospect St at Sun St, Waltham	10/13/2016
10/13/2016	1025 West Roxbury Parkway, Brookline	10/17/2016
8/11/2016	Lee St at Boylston St, (Rte 9), Brookline	10/20/2016
10/18/2016	West St at Lagrange St, West Roxbury	10/26/2016
11/2/2016	Morton St at Blue Hill Ave, Dorchester	11/7/2016
6/1/2016	Commonwealth Ave at Oakland Ave, Newton	11/30/2016
11/6/2016	2 Lynn Fells Parkway, Near W. Wyoming, Stoneham	12/22/2016
11/6/2016	122 Lynn Fells Parkway at Youle St, Melrose	12/30/2016

Date Detected	Location of Leaks/Unrepaired
6/8/2015	Allendale Rd. @ Grove St., Brookline. This leak will be addressed early spring, 2017 and to be coordinating with CIP and 8M permit water main isolations.
6/17/2015	Washington St at East St, Dedham; Single main in SEH sevice area.
7/16/2015	#56 Capt Robert Cook Dr, Needham - Sched for late Winter early Spring.
7/1/2016	241 Forest St., Winchester - Late Winter 2017 - difficult Main to close.
7/26/2016	Res Playground Cleveland Cir., - Dec/Jan/Feb Pipe is in Ball Pk, wait until frozen.
8/30/2016	Morton Street @ American Legion, W. Roxbury - repair scheduled during January.
9/28/2016	Quinobequin Road @ Rt 128, Newton - scheduled for Winter

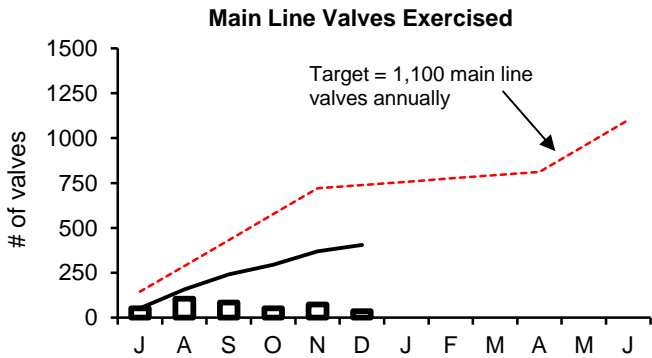
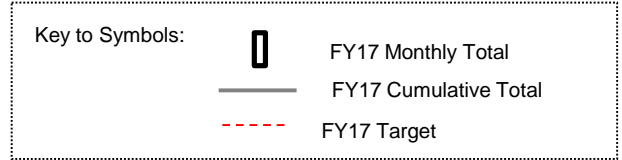
# Water Distribution System Valves

2nd Q FY17

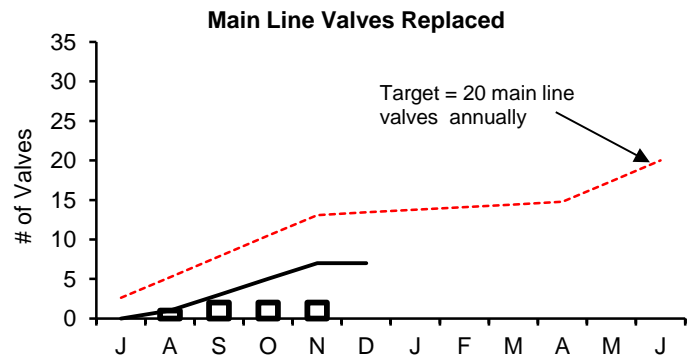
## Background

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.

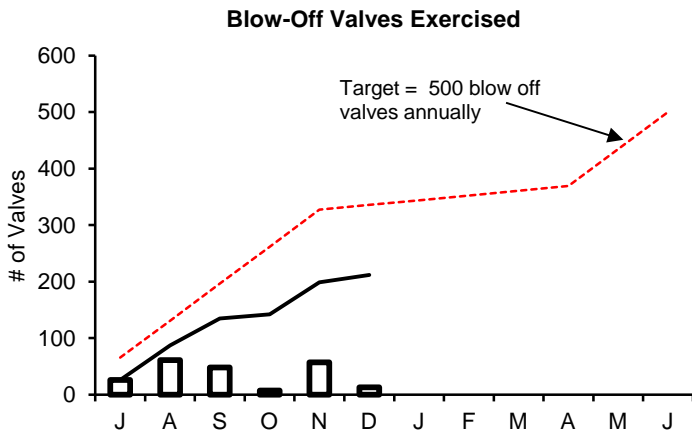
Type of Valve	Inventory #	Operable Percentage	
		FY17 to Date	FY17 Targets
Main Line Valves	2,159	97.2%	95%
Blow-Off Valves	1,317	95.7%	95%
Air Release Valves	1,380	94.3%	95%
Control Valves	49	100.0%	95%



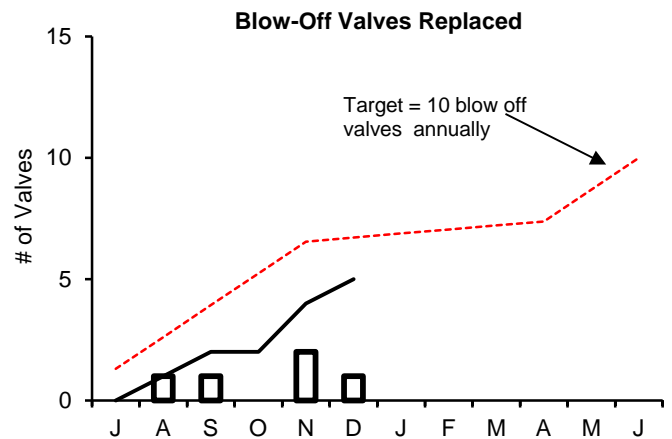
During the second quarter, 163 main line valves were exercised. The total exercised for the fiscal year is 405. Below target due to staffing vacancies and CIP/8M permit construction contract support.



During the second quarter, four main line valves were replaced. The total replaced for the fiscal year is seven.



During the second quarter, 76 blow off valves were exercised. The total exercised for the fiscal year is 211.

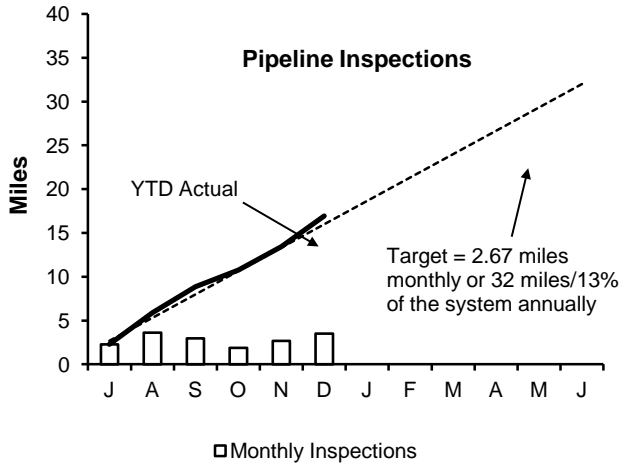


During the second quarter, 3 blow off valves were replaced. The total replaced for the fiscal year is five.

# Wastewater Pipeline and Structure Inspections and Maintenance

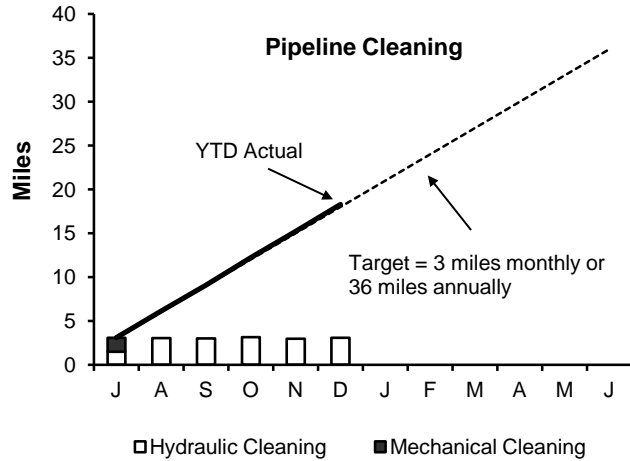
2nd Quarter - FY 17

## Inspections



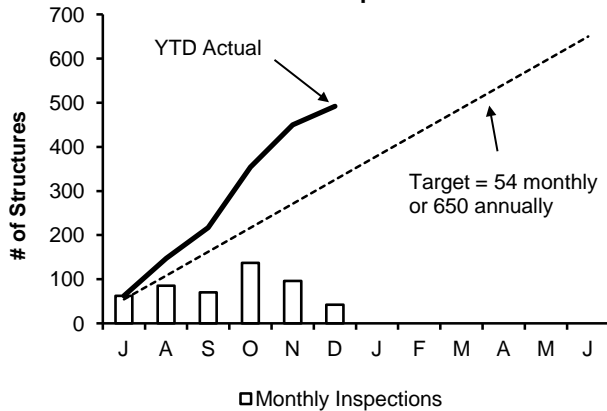
Staff internally inspected 8.06 miles of MWRA sewer pipeline during the second quarter. The year to date total is 16.94 miles. No Community Assistance was provided this quarter.

## Maintenance



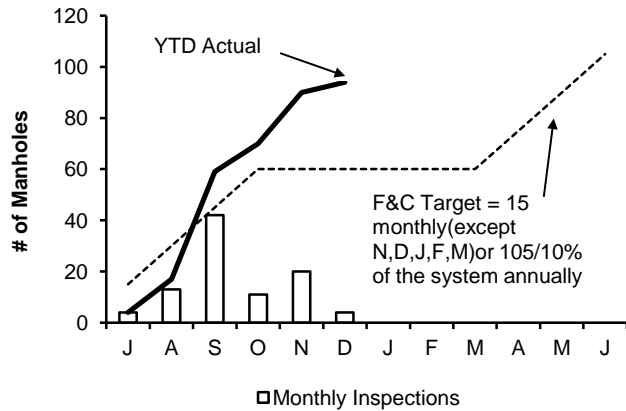
Staff cleaned 9.19 miles of MWRA's sewer system and removed 54 yards of grit and debris during the second quarter. The year to date total is 18.28 miles. Community Assistance was provided to the city of Malden. Staff cleaned 1,410 linear feet of a 10" diameter sewer line that was blocked with debris this quarter.

## Structure Inspections



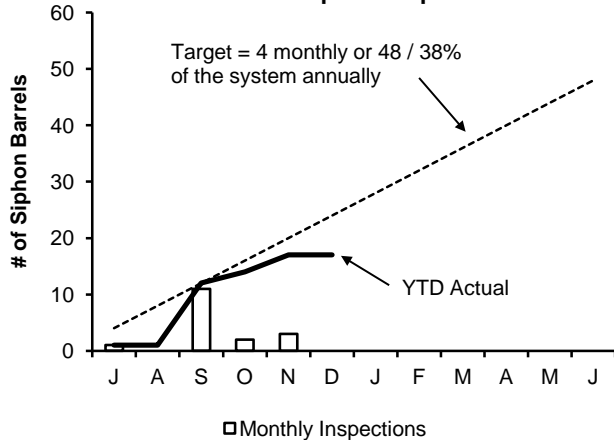
Staff inspected 36 CSO structures and performed 239 additional manhole/structure inspections during the second quarter. The year to date total is 492 inspections.

## Manhole Rehabilitation



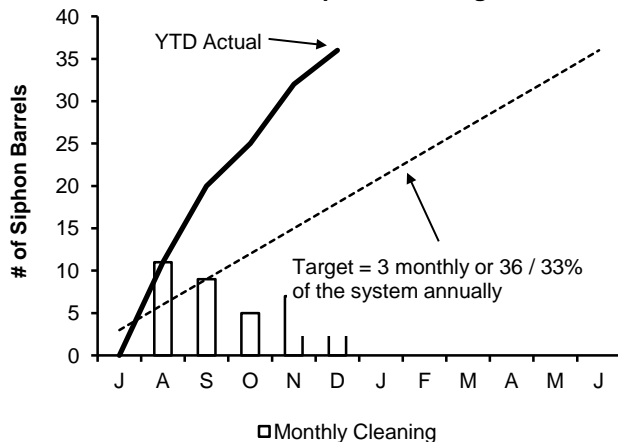
Staff replaced 35 frames & covers during the second quarter. The year to date total is 94.

## Inverted Siphon Inspections



Staff inspected 5 siphon barrels during the second quarter. Year to date total is 17 inspections.

## Inverted Siphon Cleaning



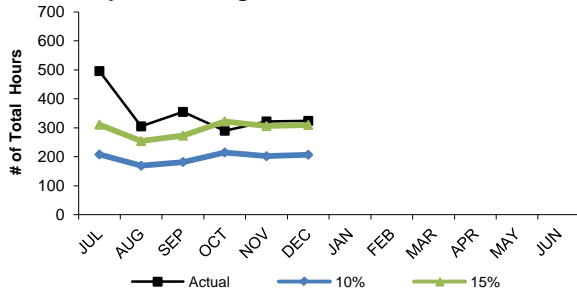
Staff cleaned 16 siphon barrels during the second quarter. Year to date total is 36.

# Field Operations' Metropolitan Equipment & Facility Maintenance

2nd Quarter - FY17

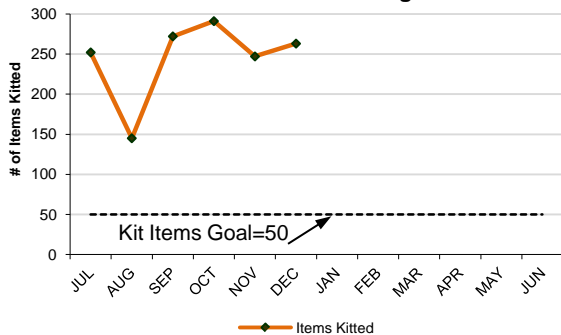
Several maintenance and productivity initiatives are in progress. The goal for the Overall PM completion and the Operator PM completion was raised to 100% for Fiscal Year 2010. The Operator PM and kitting initiatives frees up maintenance staff to perform corrective maintenance and project work, thus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

**Operations Light Maintenance PM Hours**



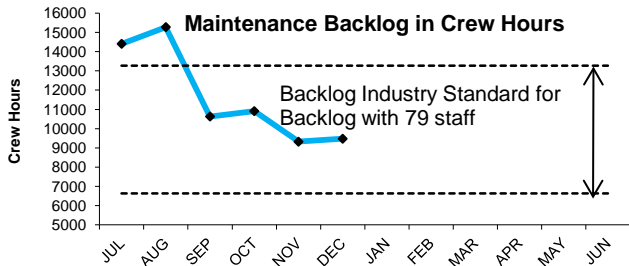
Operations staff averaged 312 hours of preventive maintenance during the 2nd Quarter, an average of 15% of the total PM hours for the 2nd Quarter, which is within the industry benchmark of 10% to 15%.

**Items Kitted Utilizing Maximo**



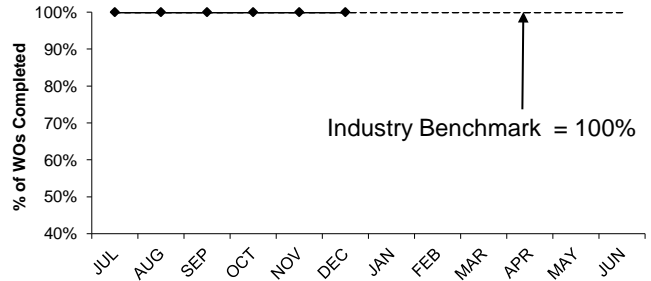
In an effort to more efficiently complete work, maintenance staff and work coordination staff have utilized the Lawson/Maximo interface to better kit stock and non stock material. The goal for FY17 is to "kit" 50 stock and non stock items total per month. An average of 267 items were kitted during the 2nd Quarter

**Maintenance Backlog in Crew Hours**



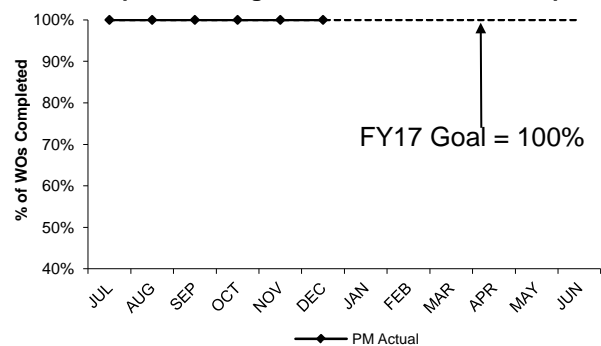
The 2nd Quarter backlog average is 9902 hours. Management's goal is to continue to control overtime and still stay within the industry benchmark of 6450 to 12,940 hours.

**Overall Preventive Maintenance**



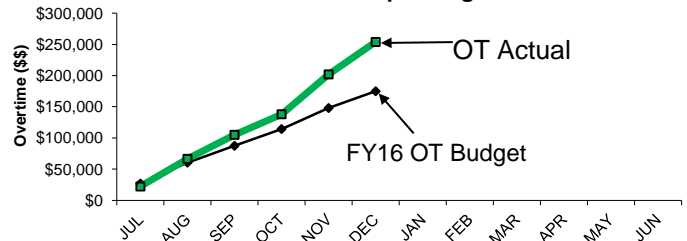
The Field Operations Department (FOD) preventive maintenance goal for FY17 is 100% of all PM work orders. Staff completed an average of 100% of all PM work orders in the 2nd Quarter.

**Operations Light Maintenance % PM Completion**



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 2nd Quarter.

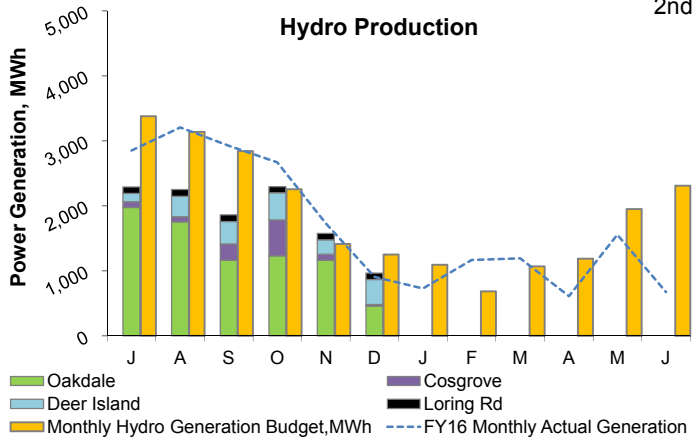
**Overtime Spending**



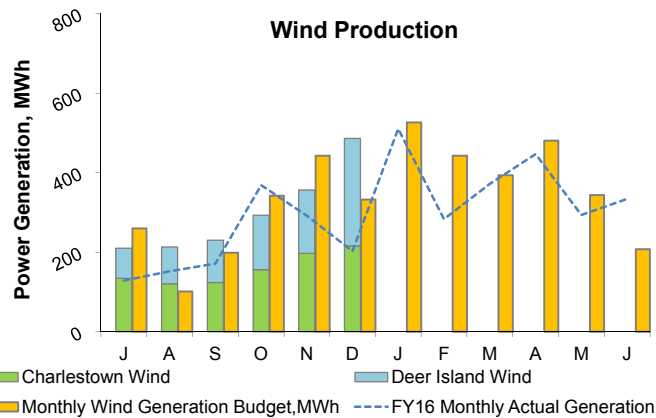
Maintenance overtime was \$61k over budget for the 2nd Quarter. Overtime was used for staging weather events and performing critical maintenance repairs.

# Renewable Electricity Generation: Savings and Revenue

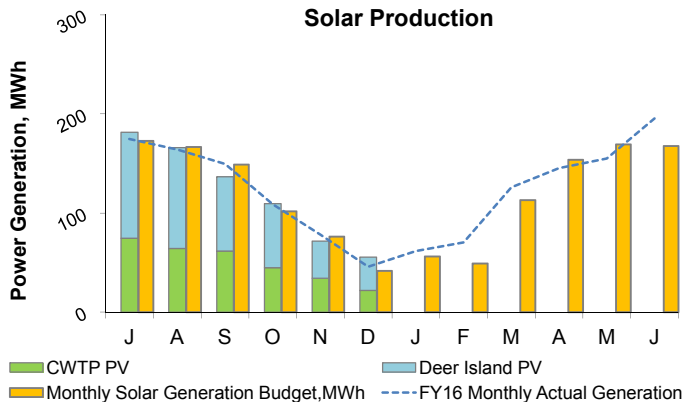
2nd Quarter - FY17



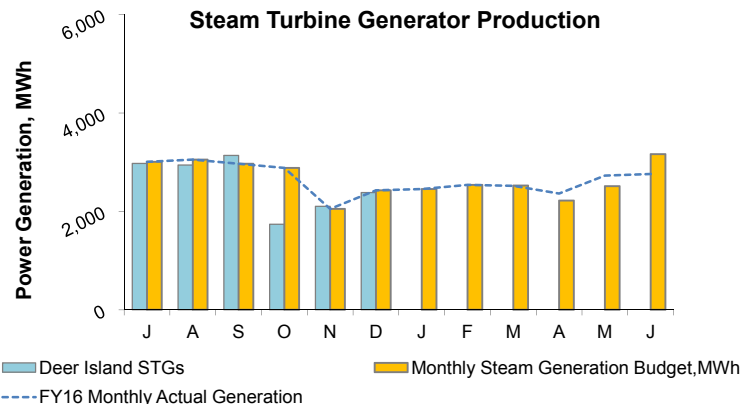
In the 2nd quarter, the renewable energy produced from all hydroelectric facilities totaled 4,835 MWh; 2% below budget<sup>3</sup>. The total energy produced to date in FY17 is 11,238 MWh; 21% below budget<sup>3</sup>, partly due to Oakdale generation values being underestimated by the utility for September; the utility data corrections will be reconciled in later months. Also, Cosgrove was operating at a lower rate for scheduled testing, and both Deer Island hydro turbines were temporarily off-line due to mechanical issues. The total savings and revenue<sup>2</sup> to date in FY17 (actuals through October<sup>1</sup>) is \$259,976; 55% below budget<sup>3</sup>, partly due to the fact that the actual electricity unit price for Deer Island has been 12% below the budgeted<sup>3</sup> estimate for the same period and due to the three reasons stated above. The savings and revenue value does not include RPS REC revenue (see next page).



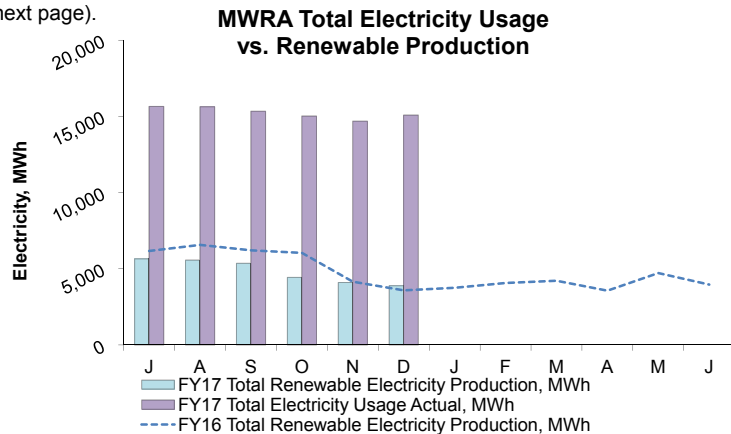
In the 2nd quarter, the renewable energy produced from all wind turbine generators totaled 1,135 MWh; 2% above budget<sup>3</sup>. The total energy produced to date in FY17 is 1,788 MWh; 7% above budget<sup>3</sup>. The total savings and revenue<sup>2</sup> to date in FY17 (actuals through October<sup>1</sup>) is \$136,095; 4% above budget<sup>3</sup>. The savings and revenue value does not include RPS REC revenue (see next page).



In the 2nd quarter, the renewable energy produced from all solar PV systems totaled 237 MWh, 8% above budget<sup>3</sup>. The total energy produced to date in FY17 is 721 MWh; 2% above budget<sup>3</sup>. The total savings and revenue<sup>2</sup> to date in FY17 (actuals through October<sup>1</sup>) is \$64,646; 3% below budget<sup>3</sup>. The savings and revenue value does not include RPS REC revenue (see next page).



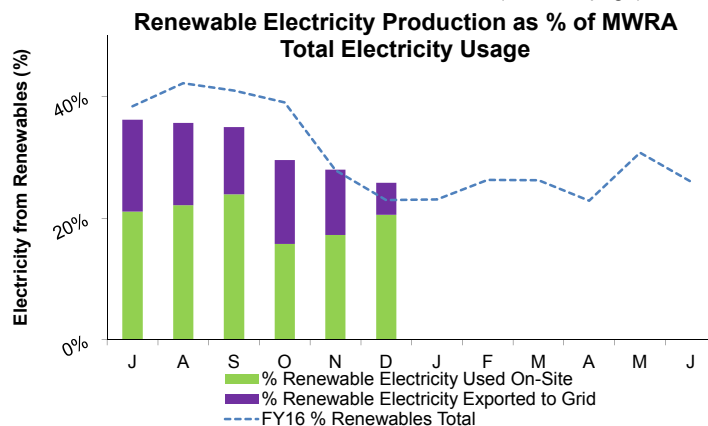
In the 2nd quarter, the renewable energy produced from all steam turbine generators totaled 6,224 MWh, 15% below budget<sup>3</sup>, due to STGs performing 40% below budget in October due to annual maintenance work on both STGs and the entire Thermal Power Plant. The total energy produced to date in FY17 is 15,282 MWh; 7% below budget<sup>3</sup>. The total savings and revenue<sup>2</sup> to date in FY17 (actuals through October<sup>1</sup>) is \$775,465; 21% below budget<sup>3</sup>, partly due to the fact that the actual electricity unit price for Deer Island has been 12% below the budgeted<sup>3</sup> estimate for the same period. The savings and revenue value does not include RPS REC revenue (see next page).



In the first 6 months of FY17, MWRA's electricity generation by renewable resources totaled 29,029 MWh. Oakdale hydro generation data was underestimated by the utility for September and will be reconciled in later months; this will be reflected in future reporting. MWRA's total electricity usage was approximately 91,410 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.

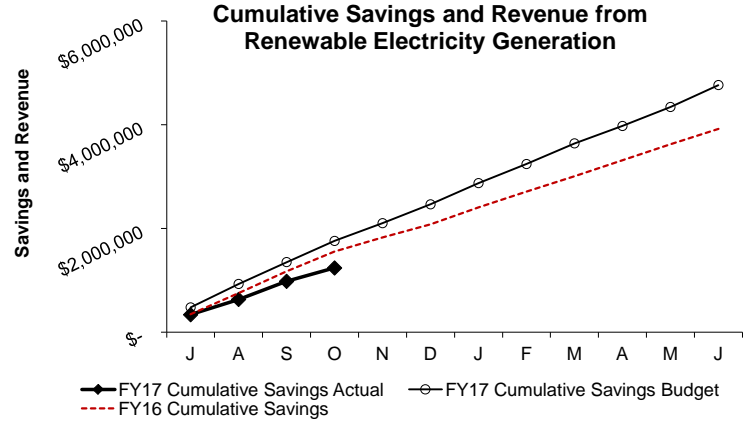
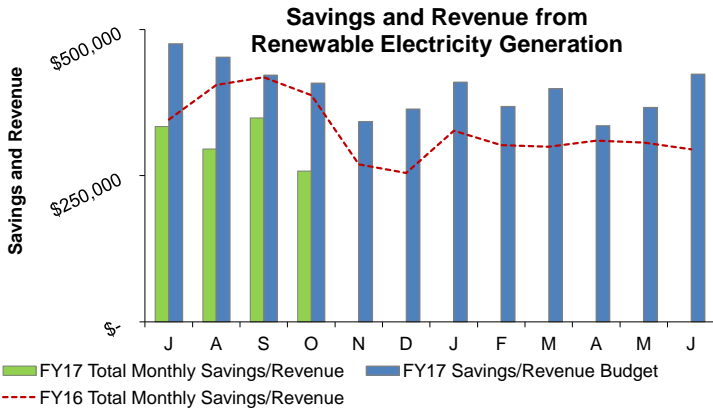
In the first 6 months of FY17, green power generation represented approximately 32% of total electricity usage. All renewable electricity generated on DI is used on-site (this accounts for more than 50% of MWRA renewable generation). Almost all renewable electricity generated off-DI is exported to the 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.

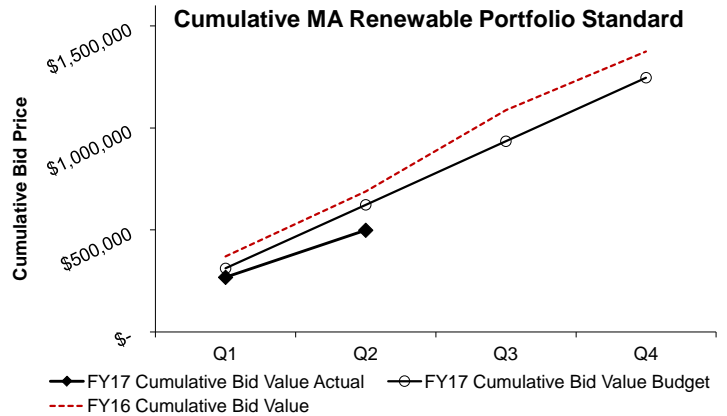
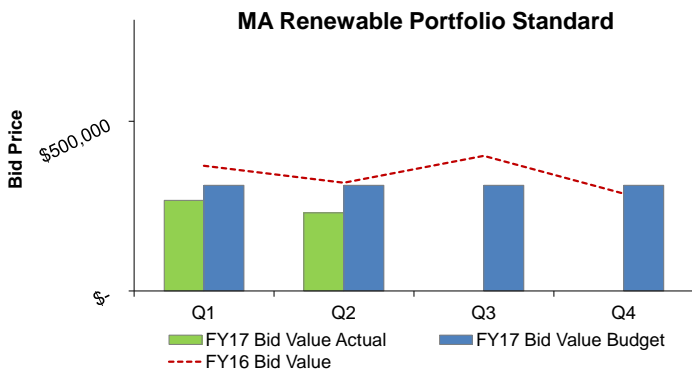


# Renewable Electricity Generation: Savings and Revenue

2nd Quarter - FY17

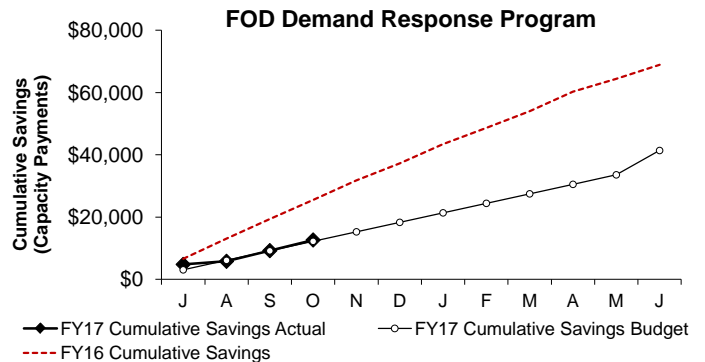
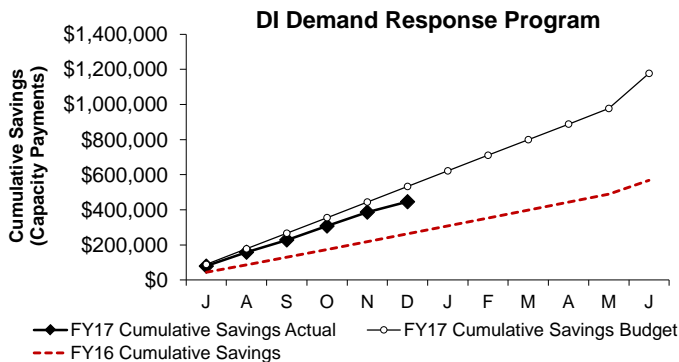


Savings and revenue from MWRA renewable electricity generation in the first 4 months of FY17 (actuals only through October<sup>1</sup>) is \$1,236,181; which is 30% below the budget<sup>3</sup>, partly due to the fact that the actual electricity unit price for Deer Island has been 12% below the budgeted<sup>3</sup> estimate for the same period. Also due to Oakdale hydro generation data being underestimated by the utility (this will be reconciled in later months and will be reflected in future reporting), and DI STGs performing 40% below budget in October due to annual maintenance work on both STGs and the entire Thermal Power Plant. Savings and revenue<sup>2</sup> 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 2nd Quarter<sup>1</sup> from MWRA's renewable energy assets; 6,073 Q2 CY2016 Class I Renewable Energy Certificates (RECs), 1,005 Q2 CY2016 Class II RECs, and 104 Q2 CY2016 Solar RECs were sold for a total value of \$230,776 RPS revenue; which is 26% below budget<sup>3</sup> for the Quarter. REC values reflect the bid value on the date that bids are accepted, even though the RECs were produced during Q2 of CY2016. Cumulative bid values reflects the total value of bids received to date.

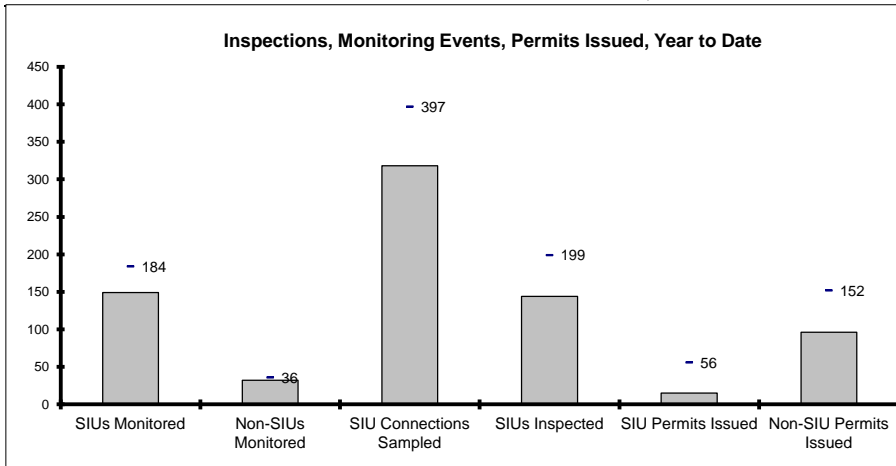
Note: Only Class I and Solar RECs were sold for Q1 CY2016 sales. All of the available Q1 CY2016 Class II RECS were transferred to the electricity supplier (Direct Energy) to meet MWRA's obligation to them.



Currently Deer Island, JCWTP, and Loring Rd participate in the ISO-New England Demand Response Programs<sup>4</sup>. 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 December<sup>1</sup> total \$445,966 for Deer Island and \$12,647 for FOD through October<sup>1</sup>.

- 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 2nd Quarter - FY17



EPA Required SIU Monitoring Events  
for FY17: 184  
YTD: **149**

Required Non-SIU Monitoring Events  
for FY17: 36  
YTD: **32**

SIU Connections to be Sampled  
For FY17: 397  
YTD: **318**

EPA Required SIU Inspections  
for FY17: 199  
YTD: **144**

SIU Permits due to Expire  
In FY17: 56  
YTD: **15**

Non-SIU Permits due to Expire  
for FY17: 152  
YTD: **96**

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.

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 at any given time. During the course of the year, some SIUs do not discharge and cannot be monitored. TRAC also monitors one-third of the non-SIUs each year. 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.

	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								
Feb								
Mar								
Apr								
May								
Jun								
% YTD	93%	91%	0%	6%	7%	3%	15	96

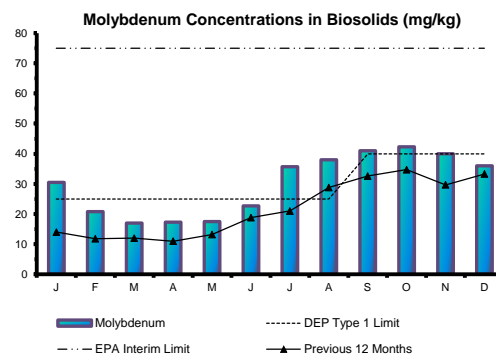
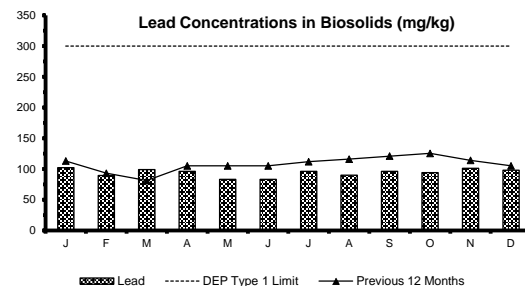
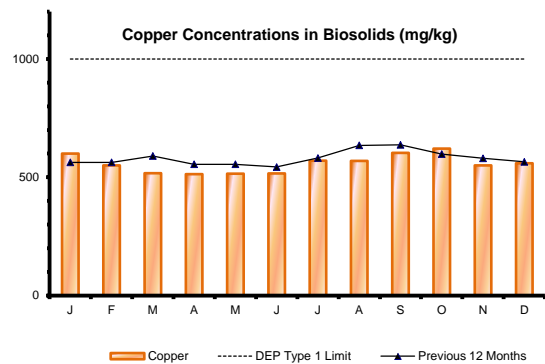
EPA requires MWRA to issue or renew 90% of SIU permits within 120 days of receipt of the application or the permit expiration date - whichever is later. EPA also requires the remaining 10% of SIU permits to be issued within 180 days. So far, for this fiscal year, the guidelines have been met regarding the timely issuing of SIU permits within 120 days.

In the 2nd Quarter of FY17, forty-nine permits were issued, eight of which were SIUs. All of the eight SIU permits were issued in the 120-day timeframe. There were four non-SIU permits issued in the 120-day to 180-day timeframe and another two non-SIU permits issued beyond the 180-day period. The TRAC department was undergoing personnel assignment changes which resulted in a few delays in permit processing. Delays also are attributable to late payment of permit fees and processing issues.

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. Cooling tower usage typically causes a seasonal spike in molybdenum concentrations due to the blowdown on large AC systems that use corrosion inhibitors containing molybdenum. Levels drop again following the end of the cooling season, although this is delayed due to biosolids processing time.

With the September 2016 change in the MassDEP 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 new higher DEP limits, possibly a consequence of the hot days of 2016. MWRA and its contractor, NEFCO, do not distribute product that does not meet the suitability standards.



# Field Operations Highlights

## 2<sup>nd</sup> Quarter – FY17

### **Western Water Operations and Maintenance**

Carroll Water Treatment: Operations Staff initiated half plant operations by shutting down flow to the A Side of the treatment process. This annual shutdown allows for Operations and Maintenance staff to complete annual maintenance and cleaning tasks that cannot be completed during full plant operation. Staff cleaned and inspected the primary contactors as well as the A Side Storage Tank and the post treatment chemical tanks. Tasks during half plant also include replacing the rupture discs on the primary contactors and replacing all of the check valves in the chemical feed systems. Plant staff also supported the pump station work that coincides with the treatment plant process. This work included installing new larger ozone destruct fans that remove the ozone from head space of the primary contactors. A weir wall was also installed downstream of the primary contactors in the effluent chamber for flow control purposes when the pump station comes on line. The reactors on the A Side Ultra Violet Treatment Plant also received the annual maintenance. This included replacing the UV Lamps that had reached the service life as well cleaning of the quartz sleeves, inspection of the wiper assemblies and calibration of all of the sensors.

### **Metro Water Operations and Maintenance**

Community Assistance - Canton Storage Tank Issue: On Tuesday, December 20<sup>th</sup>, Canton Water called to report that they were having an issue with the booster pump at the base of their Indian Hill Tank. Water Pipeline and Valve Staff responded to the site to assist in diagnosing the problem. The Mobile Pump Unit (MPU) was deployed and assembled to pump water in the service area. The root cause of the problem turned out to be a broken valve at the base of the tank. MWRA Staff assisted Canton with the replacement of the valve, which then allowed their booster pump to function normally.

### **Operations Engineering**

Larz Anderson Bridge: The contractor isolated the 30-inch main on the Larz Anderson Bridge at Section 10 to conduct another pressure test. The test again failed and Barletta is discussing helium testing to help determine the location of the loss on the pipe.

Section 56: Staff coordinated isolation of Section 56 after a contractor working for DCAM drilled into the water main mistakenly thinking it was a gas main. This was on Broad Street in Lynn in front of North Shore Community College.

Sections 19 and 58: Staff coordinated the isolation of Section 58 and 19. DOT has demolished the Arborway Bridge near the Forest Hills Station and has rerouted a portion of MWRA Section 58 and 20. Portions of Sections 19, 20 and 58 are isolated to allow the Contractor, Barletta, to connect the new pipeline sections to the existing sections.

Community Support: Continued working with Lexington developing a system hydraulic grade line. Lexington and Bedford have areas within the community that have experienced very low pressures, due to the drought and increased summer demands. The development of the grade line may help determine what may be done within their system to help increase the pressures. In September, when the water demand dropped off, both Lexington's and Bedford's pressures increased. Also, due to the drought and increased summer demand, Winchester experienced areas with low pressures, in areas are supplied by MWRA Meter 130 located on Forest Street. Testing determined that the meter will need to be increased in size. Operations Engineering is working with Engineering on the meter design and the Pipeline Group during the installation. The new meter has been ordered and construction is tentatively scheduled for March. Staff continued working with the Lynn to create a plan to supply their reservoirs during a drought period. Operations Engineering coordinated with the Pipeline Section to retrofit two emergency connections, to allow the MWRA to supply Lynn's Reservoirs directly at their required flow rate.

### **Wastewater Operations & Maintenance**

Alewife Brook Pump Station Rehabilitation-Contract #6797: Wastewater Operations staff is working with Construction staff and the Contractor for this project. The contractor installed one of the bypass pumping discharge pits and poured the walls for the discharge chamber. Operations staff attended multiple meetings to review the Contractor's Bypass Pumping Plan for this project. Operations Staff attended monthly Project Coordination Meetings onsite at the facility. Staff also attended several PCB Abatement Coordination Meetings in December with Union Leadership, the Contractor, Subcontractor (PCB Abatement), the Consultant and Authority Engineering & Construction Staff. Operations locked out/tagged out the Dry Weather Pump #4 on 12/22/16 so the contractor could inspect the downstream 24-inch sewer line.



## Wastewater Operations & Maintenance (cont.)

Nut Island Standard Operating Procedures (SOPs): Operations staff wrote updated SOPs for putting screening channels and grit vortexes online and offline in remote control (via SCADA) and manual control (local controls). All Operations Staff will be trained on the updated SOPs. Training was ongoing during the month of December.

### Metering

Meter Systems: Staff continues to work with Newton to assist with their leak detection efforts. Notified Chelsea, Everett (3), Milton, Nahant, Northboro, Norwood and Westwood of increases in flow. Staff continued to work with Arlington, Newton and Waltham to deal with their water loss issues.

### TRAC

Compliance and Enforcement: TRAC previously issued a Penalty Assessment Notice (PAN) to Absolute Metal in response to their discharge of wastewater containing excessive levels of cyanide into the MWRA sanitary sewer in violation of EPA Limits, MWRA Sewer Use Regulations, Absolute Metal's MWRA Sewer Use Discharge Permit and the April 15, 2015 Notice of Noncompliance and Order issued to Absolute Metal by the MWRA. Absolute paid the \$15,500 penalty in full on November 29, 2016. The facility has returned to compliance.

### Environmental Quality-Water

Community Support: Staff, in coordination with Operations Engineering and the Planning Department, continued to meet with Community Water Department staff in October. Discussions focus on a review of water meter data, total coliform sampling plans, chlorine residual data, storage tank monitoring and system hydraulics. During the Quarter, MWRA Staff met with Representatives from Brookline, Norwood, Reading, Lexington and Waltham.

Staff provided Emergency Response Training to communities that attended training in November and December. Presentations focused on ways in which communities can troubleshoot low chlorine residuals within their community and what parameters can be tested to possibly diagnose high water age or nitrification.

Staff provided drinking water sampling and testing support to Malden on December 9<sup>th</sup>. Staff sampled chlorine residual, pH and alkalinity from several samples throughout the community. Results were forwarded to the Malden Water Department and DEP-NERO.

### Environmental Quality-Wastewater

Ambient Monitoring: Ambient monitoring field work for 2016 was completed and results are being delivered on an ongoing basis. All Contingency Plan (CP) Thresholds Tests for 2016 Ambient Monitoring are completed. There was only one exceedance of an Ambient Monitoring CP Threshold in 2016 for a potential nuisance algae. Evaluation of the data indicates that this was caused by natural factors unrelated to outfall discharge. Staff are preparing a proposal to regulators to eliminate this CP Threshold, as recommended to and approved by EPA's Outfall Monitoring Science Advisory Panel in October.

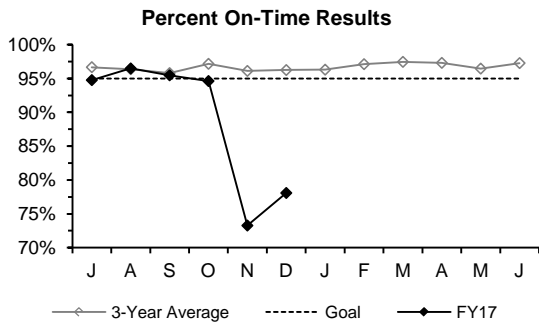
Monitoring results from 2014 and 2015 were summarized at a meeting of the EPA's Outfall Monitoring Science Advisory Panel in October. The Permit-Required *Outfall Monitoring Overview*, summarizing the results of 2015 monitoring, was presented to the Board in October and submitted to regulators in November as required by the permit.

Harbor/Beach/CSO Monitoring: Completed CSO receiving water sampling for the year included post-monitoring-season sampling of two storms. The CSO receiving water monitoring scope of work was submitted to DEP as required by the Variances for the Charles and Alewife/Mystic. In 2017 the monitoring will be further enhanced by weekend sampling following a limited number of storms. Completed a statistical analysis of the beach water quality data for summer 2016.

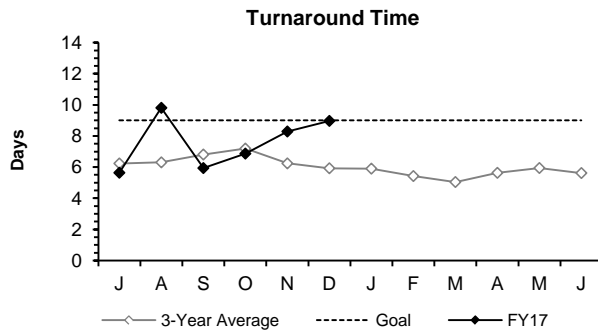
Coordination with Other MWRA Departments: Worked with Engineering & Construction, Planning, and Real Property & Environmental Management to assess NPDES permit requirements applicable to the Wachusett Aqueduct Pump Station which is currently under construction.

Cooperation with Other Agencies: Staff participated in meetings of the Massachusetts Bays Program and (with DLS) held a coordination meeting with Technical Staff from the four local watershed associations for which DLS provides laboratory support.

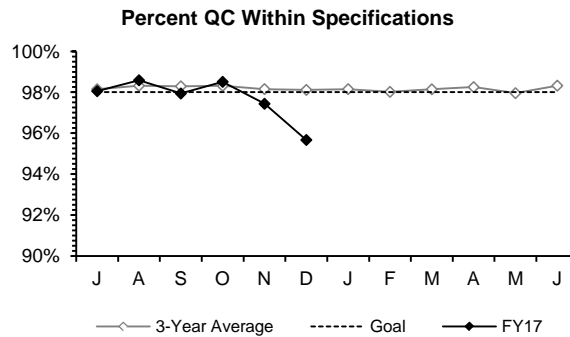
## Laboratory Services 2nd Quarter - FY17



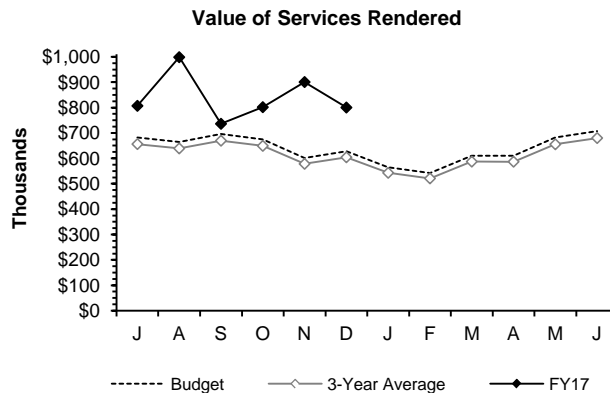
The Percent On-Time measurement was below the 95% goal due to the School Lead samples. Without these we were 96% on-time. Our goal for school samples is 14 days; due to the high volume, actual turn-around for school samples averaged samples was 25 days.



Turnaround Time was faster than the 9-day goal. Our TAT for the non-School Lead samples was 5.3 days.



Percent of QC tests meeting specifications was below the 98% in-house goal due to the learning curve for the new automated solid phase extraction sample preparation for semivolatiles. 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 due to the School Lead project.

### Highlights:

#### Southboro Lab:

Completed the move back into the renovated Southboro Lab on December 11th.

#### School Lead:

Continued to test school lead samples from communities as quickly as they came in. In December we received 2,049 lead and copper tests and completed 3,728 tests. By the end of December the heavy backlog had been reduced to 1,337. Staff have been consistently meeting or exceeding our target of completing at least 500 tests per week. In December the average turnaround time for School Lead samples was 25 days, so many of the samples weren't meeting the target turnaround time of 14 days. Through December we have completed 21,600 school and non-school lead and copper tests this calendar year.

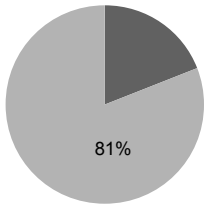
#### Percent QC Within Specifications:

In December, 484 of 11,174 QC checks didn't meet in-house requirements, so our percentage of QC within specifications dipped below our goal of 98%. While this didn't affect regulatory reporting, it did require re-work for 199 of these QC results. Most of these were associated with a new automatic sample extraction system for semivolatiles organic chemicals that is resulting in reduced solvent use and solvent emissions.

# CONSTRUCTION PROGRAMS

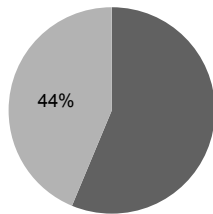
## Projects In Construction 2nd Quarter – FY17

### Money



■ Amount Remaining  
■ Billed to Date

### Time



■ Days Remaining  
■ Days Expended

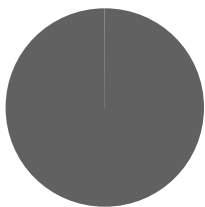
### NIH Section 110 Reading & Woburn

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

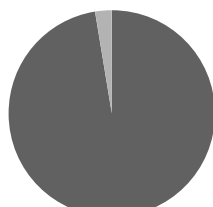
Status and Issues: As of December, the Contractor completed pipeline testing of the 36" mainline from West Street Sta. 100+00 to Sta. 115+58.5. Through December approximately 98% of the mainline pipe was installed. Contractor will work on meter vaults during winter months.

### Money



■ Amount Remaining  
■ Billed to Date

### Time



■ Days Remaining  
■ Days Expended

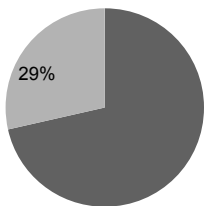
### Chelsea Creek Headworks Upgrade

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

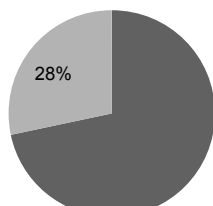
Status and Issues: As of December no physical work has begun. The Contractor and RE are now working out of their field office.

### Money



■ Amount Remaining  
■ Billed to Date

### Time



■ Days Remaining  
■ Days Expended

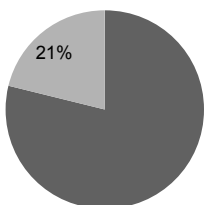
### Wachusett Aqueduct Pumping Station

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

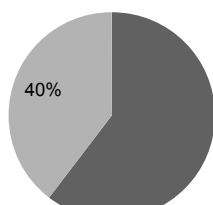
Status and Issues: As of December, the Contractor continued with formwork, steel and concrete for the wet well walls, BFV vault walls and the bottom of the roof slab.

### Money



■ Amount Remaining  
■ Billed to Date

### Time



■ Days Remaining  
■ Days Expended

### Alewife Brook Pump Station Improvements

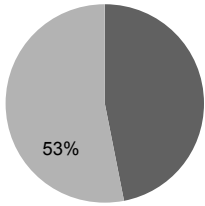
Project Summary: This project involves the replacement of wet-weather pumps, motors, gear drives, VFD's, MCC, screens, sluice gates, standby generator, roof, PLC's and HVAC. Also, the remediation of PCB's and asbestos and the installation of a flow meter on the 66-inch downstream Alewife Brook Conduit.

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

Status and Issues: As of December, the Contractor completed the construction of the Bypass Chamber/ Metering Vault. They continued installing electrical conduit for temporary construction/bypass pumping power.

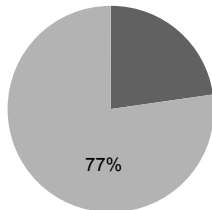
## Projects In Construction 2nd Quarter – FY17

### Money



■ Amount Remaining  
■ Billed to Date

### Time



■ Days Remaining  
■ Days Expended

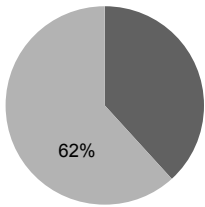
### Caruso Pump Station Improvements

**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:** 24-Mar-2017

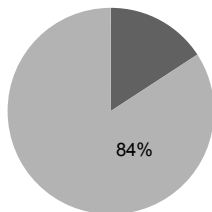
**Status and Issues:** As of December, the Contractor completed the installation of high roof and elevator penthouse. They replaced the existing generator exhaust and muffler. They cored a new opening and provided additional structural support at the generator roof.

### Money



■ Amount Remaining  
■ Billed to Date

### Time



■ Days Remaining  
■ Days Expended

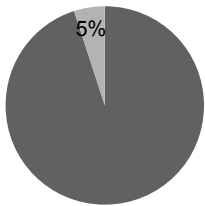
### DITP Valves and Piping Replacements

**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

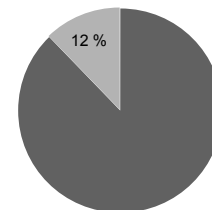
**Status and Issues:** The Contractor nearly completed the demolition and replacement of existing 14" PSL-B glass lined piping in the Residual Galleries; only needs to make the final tie in at the Gravity Thickener Distribution Box.

### Money



■ Amount Remaining  
■ Billed to Date

### Time



■ Days Remaining  
■ Days Expended

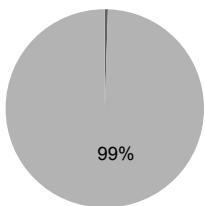
### Winthrop Terminal VFD and Motor

**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

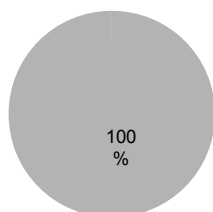
**Status and Issues:** The Contractor, JFW has begun preparing major equipment submittals. No physical work took place.

### 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

2nd Quarter – FY17

All 35 projects in the Long-Term CSO Control Plan are complete, in compliance with Schedule Seven. Remaining CSO related capital spending totaling \$12.8 million is authorized and scheduled through December 2020. Remaining work includes Cambridge’s completion of surface restoration work associated with the Alewife/CAM004 sewer separation contracts, BWSC’s removal of additional inflow from its sewers in the South Dorchester Bay sewer separation areas of Dorchester, and the federal court mandated three-year CSO post-construction monitoring and performance assessment (2018-2020).

Project/Item	Status as of December 31, 2016
BWSC Memorandum of Understanding and Financial Assistance Agreement	BWSC attained substantial completion of its last project, Reserved Channel Sewer Separation, in December 2015 in compliance with Schedule Seven. MWRA staff are conducting final eligibility reviews of the BWSC construction contracts that were administered and managed by BWSC with MWRA funding. On December 14, 2016, the Board of Directors authorized Amendment 16 to the Financial Assistance Agreement extending the term of MWRA financial assistance by six months to June 2017 with no increase to the award amount. The amendment provides for BWSC use of CSO account funds as its staff continue to support and respond to the remaining MWRA final eligibility reviews.
South Dorchester Bay Sewer Separation Post-Construction Inflow Removal	As previously reported, BWSC has completed its investigation of alternatives for removing additional stormwater inflow from its Dorchester Interceptor, following completion of sewer separation and the closing of CSOs several years ago. MWRA’s CIP includes \$5.4 million for the inflow removal effort, of which \$2.7 million has been transferred to the BWSC CSO account and \$1.6 million of that has been withdrawn by BWSC to fund related design and construction work. Staff plan to remove the remaining \$3.8 million from the BWSC MOU/FAA, develop a separate financial agreement with BWSC for its use of these remaining funds, and close out the MOU/FAA when its term ends on June 30, 2017. Staff expect to seek Board approval for the new agreement this spring.
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. On December 14, 2016, the Board of Directors approved Amendment 13 to the MOU/FAA increasing the award amount by \$1,509,899 from \$98,668,856 to \$100,178,755 and extending the terms of the agreements by six months to June 30, 2018. Extensive surface restoration work eligible for MWRA funding at a remaining award amount of \$5.7 million is currently scheduled to continue through December 2017.
MWRA CSO Performance Assessment	Staff are evaluating system wet weather performance and performance predictions, including comparisons of MWRA and community meter data to MWRA model predictions, and are currently developing a supplemental metering approach that staff plan to implement during the assessment period 2018-2020. The Charles River and Alewife Brook/Upper Mystic River CSO variances recently extended by DEP to 2019 include a requirement that MWRA submit a draft scope of the post-construction monitoring program and performance assessment to DEP by May 2017. MWRA’s FY17 CIP includes funds for the three-year performance assessment.

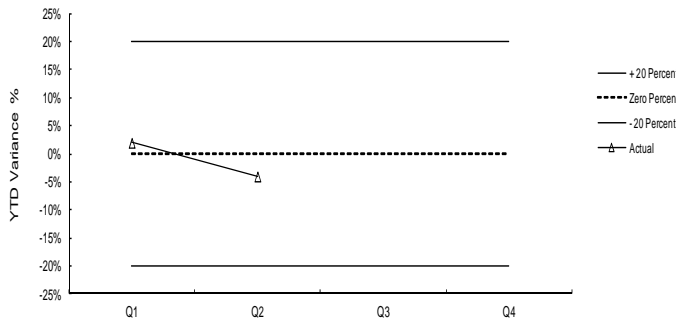
## CIP Expenditures 2<sup>nd</sup> Quarter FY17

FY17 Capital Improvement Program Expenditure Variances through December by Program (\$ in thousands)				
Program	FY17 Budget Through December	FY17 Actual Through December	Variance Amount	Variance Percent
Wastewater	27,702	24,281	(3,422)	-12%
Waterworks	28,023	29,554	1,531	5%
Business and Operations Support	3,374	2,848	(526)	-15%
<b>Total</b>	<b>\$59,099</b>	<b>\$56,682</b>	<b>(\$2,417)</b>	<b>-4%</b>

Underspending within Wastewater is primarily due to a delay for final restoration work for the Cambridge Sewer Separation, and construction issues with the Caruso Pump Station Improvements, delay in the award of the Chelsea Creek Upgrade Construction, fewer than anticipated community requests for loans and grants for the Infiltration/Inflow (I/I) program and equipment delays for the Deer Island North Main Pump Station and Winthrop Terminal Facility Butterfly Valve Replacement. This was partially offset by construction progress on the Deer Island Fuel Oil System Upgrades, Alewife Brook Pump Station Rehabilitation, Winthrop Terminal Facility Variable Frequency Drives Replacement Construction, Clinton Phosphorus Reduction Construction, and timing of final work on the Chelsea Screenhouse and DI Electrical Upgrades contracts. Overspending in Waterworks is primarily due to contractor progress on Section 89/29 Redundancy Phase 1B Construction, Southern Extra High Section 111 Construction, Quabbin Release Pipeline Construction, and additional work for the Webster Avenue Bridge Pipe Replacement Construction. This was partially offset by construction issues resulting in less than anticipated progress for the Wachusett Aqueduct Pump Station Construction, Rosemary Brook Building Repairs, and Beacon Street Line Construction contracts.

### Budget vs. Actual CIP Expenditures (\$ in thousands)

Total FY17 CIP Budget of \$155,702,000.



### 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 12/24/2016	\$64.9 million
Unused capacity under the debt cap:	\$1.243 billion
Estimated date for exhausting construction fund without new borrowing:	MAR-17
Estimated date for debt cap increase to support new borrowing:	Not anticipated at this time
Commercial paper/Revolving loan outstanding:	\$128 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

2nd Quarter – FY17

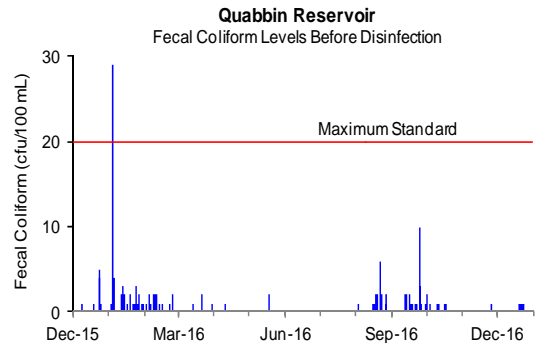
### Source Water – Microbial Results

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 2nd 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%.**

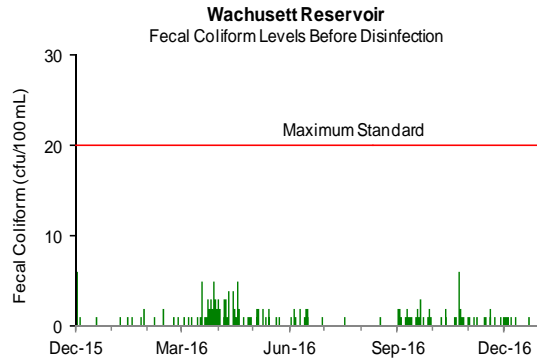


#### Sample Site: Wachusett Reservoir

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 2nd Quarter were below 20 cfu/100ml. **For the current six-month period, 0.0% of the samples exceeded a count of 20 cfu/100mL.**

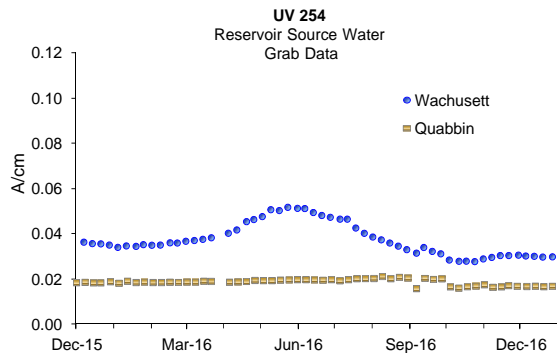


### Source Water – UV Absorbance

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 0.017 A/cm.

Wachusett Reservoir UV-254 levels are currently around 0.030 A/cm.



## Source Water – Turbidity

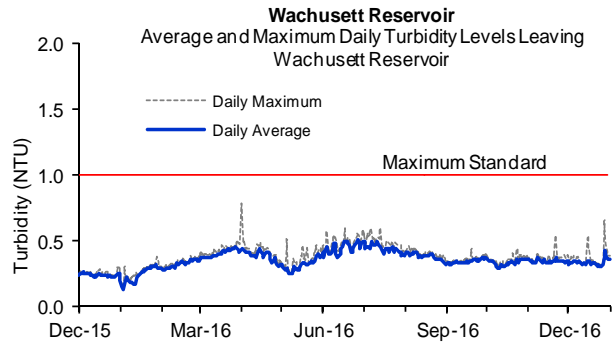
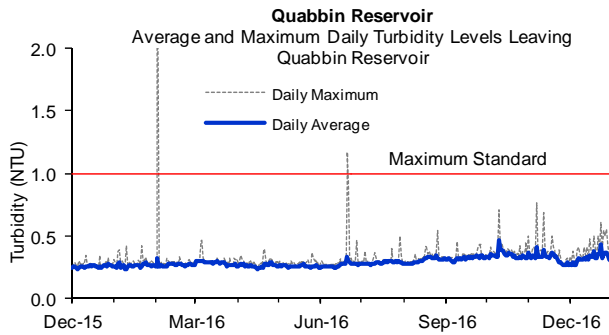
### 2nd Quarter – FY17

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 Quabbin and Wachusett were within DEP standards for the quarter.

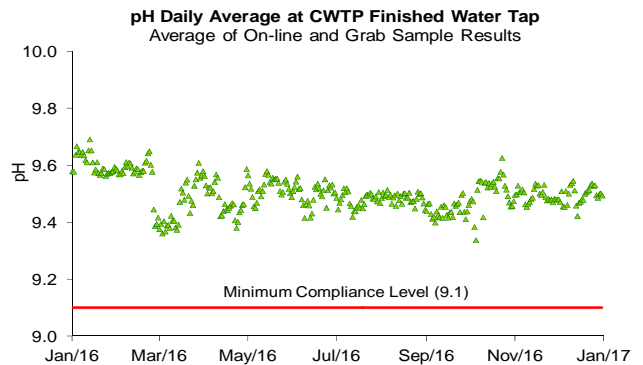
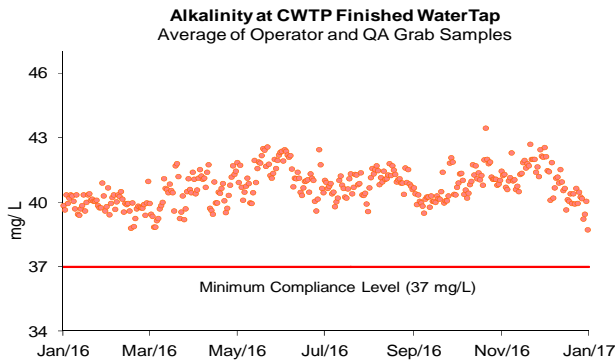


## Treated Water – pH and Alkalinity Compliance

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](http://www.mwra.com/water/html/awqr.htm).

Distribution system samples were collected on December 7 and 8, 2016. Distribution system sample pH ranged from 9.3 to 9.6 and alkalinity ranged from 40 to 44 mg/L. No sample results were below DEP limits for this quarter.



## Treated Water – Disinfection Effectiveness

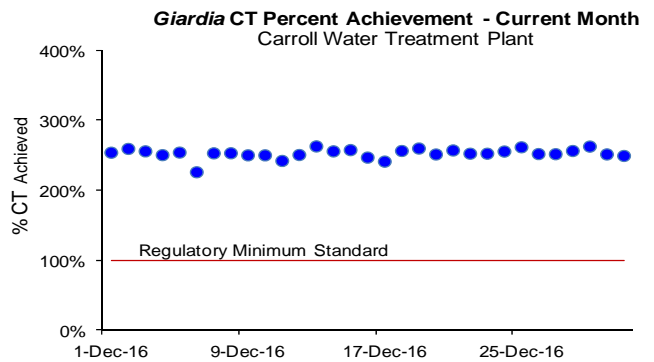
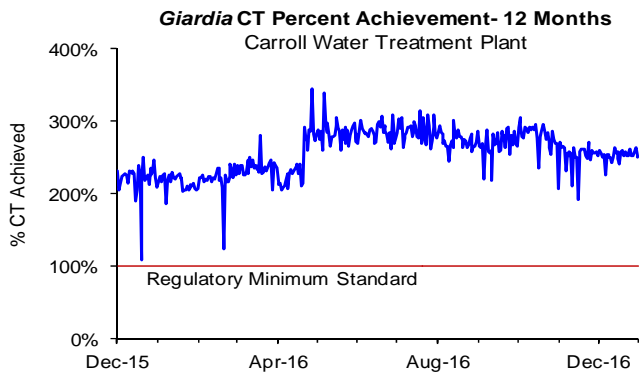
2nd Quarter – FY17

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.

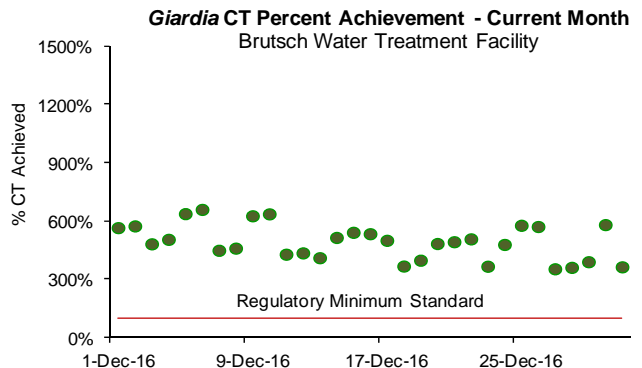
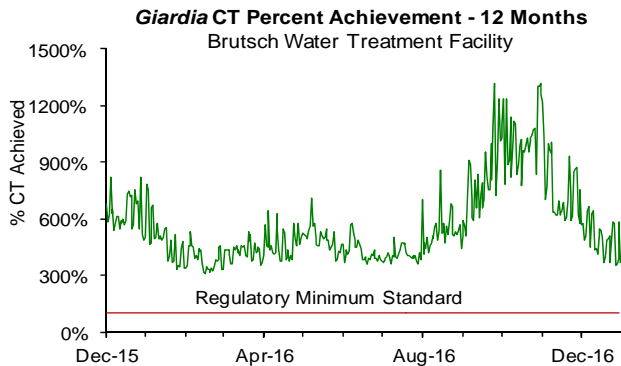
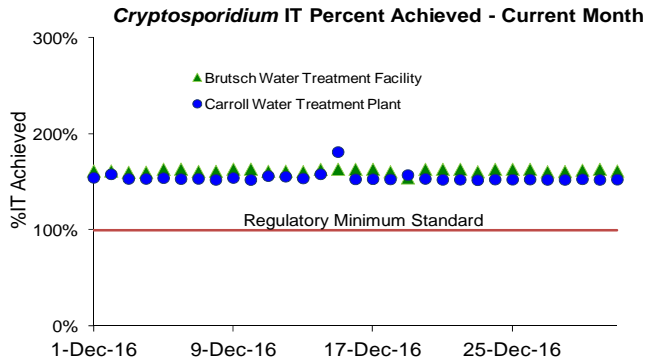
### Wachusett Reservoir – MetroWest/Metro Boston Supply:

- Ozone dose at the CWTP varied between 0.9 to 1.1 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 (June 1 – October 31) target of  $\geq 1.0$  mg/L 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%.



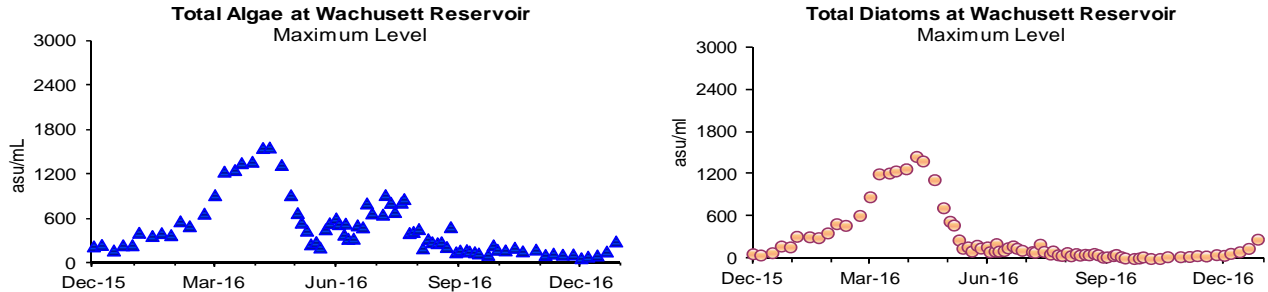
## Source Water - Algae

### 2nd 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 2nd Quarter, one complaint which may be related to algae was reported from a local water department.



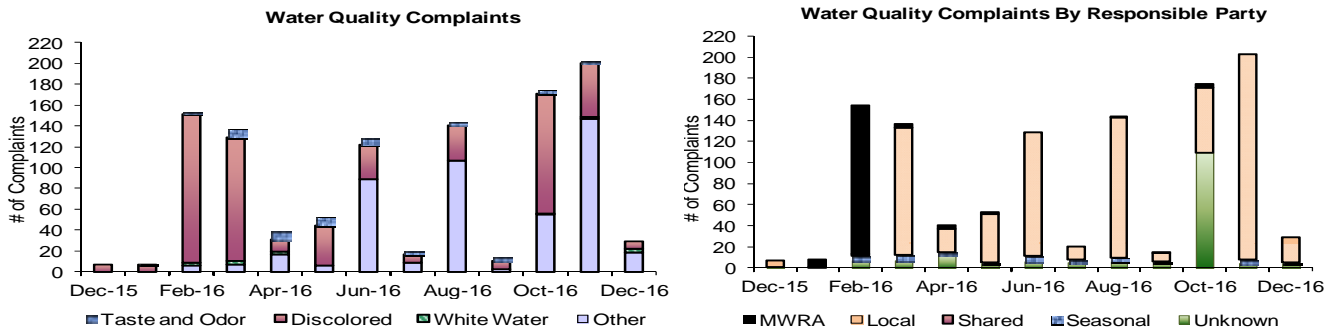
## Drinking Water Quality Customer Complaints: Taste, Odor, or Appearance

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 232 complaints during the quarter compared to 11 complaints for 2nd Quarter of FY15. Of these complaints, 58 were for "discolored water", 3 were for "taste and odor", 6 were for "white water", and 165 were for "other". Of these complaints, 219 were local community issues, 5 were seasonal in nature, and 8 were unknown in origin.

- On 10/25/2106, Marlborough reported fifty discolored water complaints due to a local water main break.
- On 10/25/2016, Winchester reported one hundred no water complaints which may be related to an ongoing local Flushing program initiated in early October 2016.
- On 11/1/2106, Brookline reported a combined fifty-five 'no water' and 'discolored water' complaints when a water main break occurred along West Roxbury Parkway. The Brookline WD was able to repair the break and have service restored to the area.
- On 11/1/2106, Quincy reported one hundred 'no water' complaints when a valve was blown during preventive maintenance work on a hydrant branch gate valve. The Quincy WD notified the customers of this event as they isolated and repaired the branch.
- On 11/10/2106, Swampscott reported a combined thirty-five 'no water' and 'discolored water' complaints when a water main break occurred. Swampscott WD was able to repair the break and have service restored to the area.



# Bacteria & Chlorine Residual Results for Communities in MWRA Testing Program

2<sup>nd</sup> 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 2<sup>nd</sup> Quarter, 14 of the 6,207 community (0.21% system-wide) samples submitted to MWRA labs for analysis tested positive for total coliform. Three of the 1,901 MWRA samples (0.16%), tested positive for total coliform (Bedford, Somerville, South Hadley FD1 – October; Boston, Framingham, Malden - November; Malden, Melrose, Marlborough - December). Bedford was required to conduct a Level 2 as this was their second exceedance in twelve months. Only 2.2% 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 <sup>e</sup>	Violation	Minimum Chlorine Residual (mg/L)	Average Chlorine Residual (mg/L)	
MWRA	MWRA Locations	333	0 (0%)	0	Level	1.99	2.54	
	Shared Community/MWRA sites	1568	3 (0.19%)	0	1 / 2	0.01	2.13	
	<b>Total: MWRA</b>	<b>1901</b>	<b>3 (0.16%)</b>	<b>0</b>	<input type="checkbox"/> / <input type="checkbox"/>	<b>0.01</b>	<b>2.21</b>	
Fully Served	ARLINGTON	156	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.21	1.91	
	BELMONT	104	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.01	1.49	
	BOSTON	783	1 (0.13%)	0	<input type="checkbox"/> / <input type="checkbox"/>	1.02	2.31	
	BROOKLINE	224	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.58	2.10	
	CHELSEA	169	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	1.60	2.51	
	DEER ISLAND	62	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	1.94	2.24	
	EVERETT	169	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.25	2.23	
	FRAMINGHAM	237	1 (0.42%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.40	2.24	
	LEXINGTON	117	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.10	2.19	
	LYNNFIELD	18	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.32	1.11	
	MALDEN	243	3 (1.23%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.00	1.89	
	MARBLEHEAD	72	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.19	2.01	
	MEDFORD	204	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	1.27	1.92	
	MELROSE	123	2 (1.63%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.89	1.90	
	MILTON	102	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.11	1.90	
	NAHANT	30	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	1.12	1.96	
	NEWTON	277	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.06	2.09	
	NORTHBOROUGH	48	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.11	1.61	
	NORWOOD	99	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.08	1.98	
	QUINCY	299	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.29	1.93	
	READING	130	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.18	1.61	
	REVERE	180	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	1.61	2.19	
	SAUGUS	104	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	1.37	1.82	
	SOMERVILLE	276	1 (0.36%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.58	2.32	
	SOUTHBOROUGH	30	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.14	1.91	
	STONEHAM	91	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	1.51	2.27	
	SWAMPSCOTT	54	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.24	1.63	
	WALTHAM	216	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.75	2.32	
	WATERTOWN	120	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.63	2.00	
	WESTBORO HOSPITAL	15	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.05	0.17	
	WESTON	45	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	2.20	2.56	
	WINTHROP	73	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.36	1.96	
		<b>Total: Fully Served</b>	<b>4860</b>	<b>8 (0.16%)</b>				
	CVA & Partially Served	BEDFORD	66	4 (6.06%)	0	<input type="checkbox"/> / <input checked="" type="checkbox"/>	0.59	1.65
CANTON		87	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.04	1.31	
HANSCOM AFB		27	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.24	1.64	
MARLBOROUGH		129	1 (0.78%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.06	2.21	
NEEDHAM		123	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.04	0.49	
PEABODY		234	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.36	2.01	
WAKEFIELD		146	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.97	2.07	
WELLESLEY		112	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.02	0.67	
WILMINGTON		86	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.22	1.79	
WINCHESTER		91	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.10	1.62	
WOBURN		195	0 (0%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.13	0.91	
SOUTH HADLEY FD1		51	1 (1.96%)	0	<input type="checkbox"/> / <input type="checkbox"/>	0.15	0.50	
		<b>Total: CVA &amp; Partially Served</b>	<b>1347</b>	<b>6 (0.37%)</b>				
	<b>Total: Community Samples</b>	<b>6207</b>	<b>14 (0.21%)</b>					

(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

2nd 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.

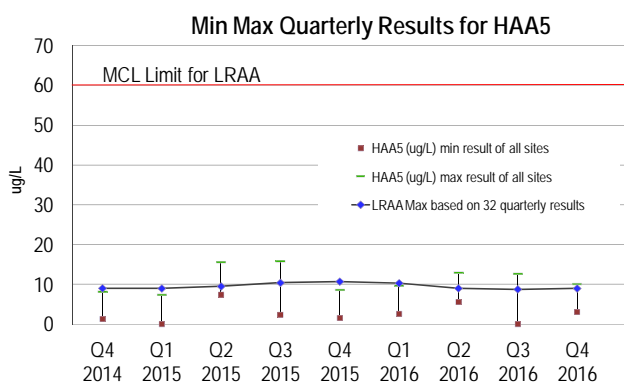
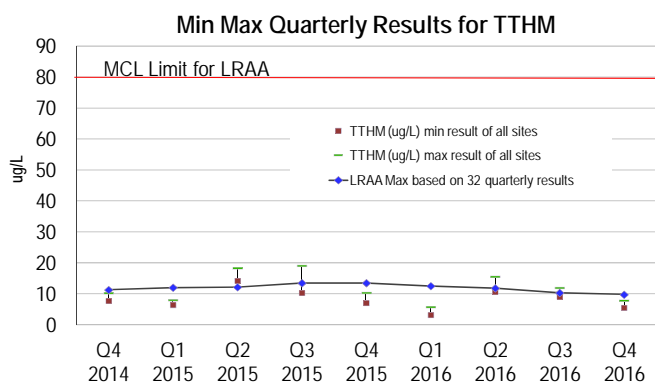
The locational running annual average at each individual sampling location must be below the standard. The charts below show the highest and lowest single values for all sites, and the LRAA of the highest location each quarter.

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).

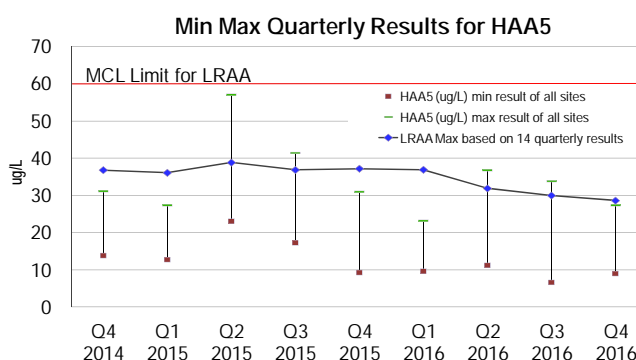
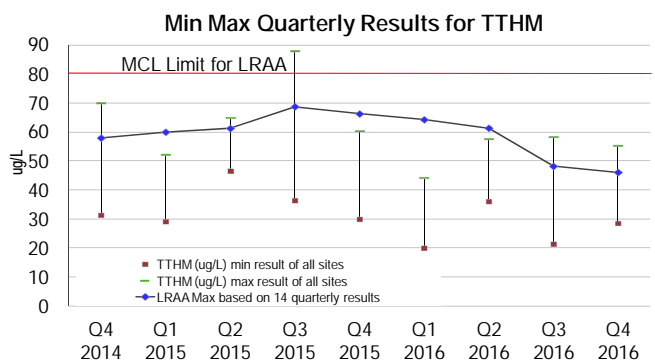
Bromate is tested monthly per DEP requirements for water systems that treat with ozone. Bromide in the raw water may be converted into bromate following ozonation. EPA's RAA MCL standard for bromate is 10 µg/L.

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 = 9.8 µg/L; HAA5s = 9.0 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

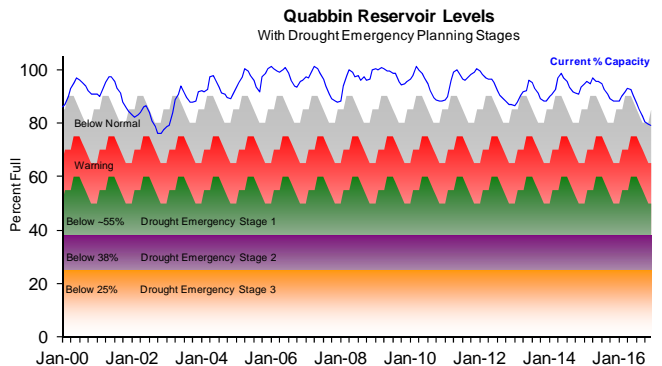
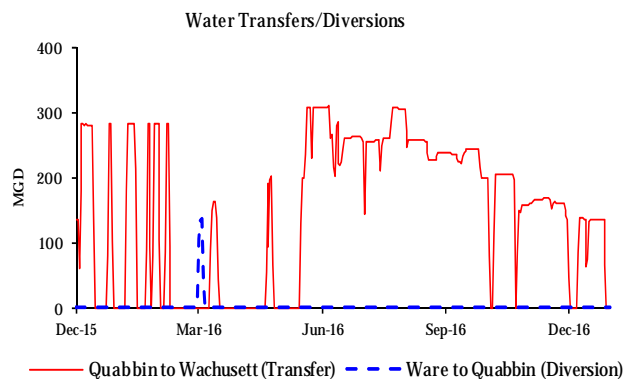
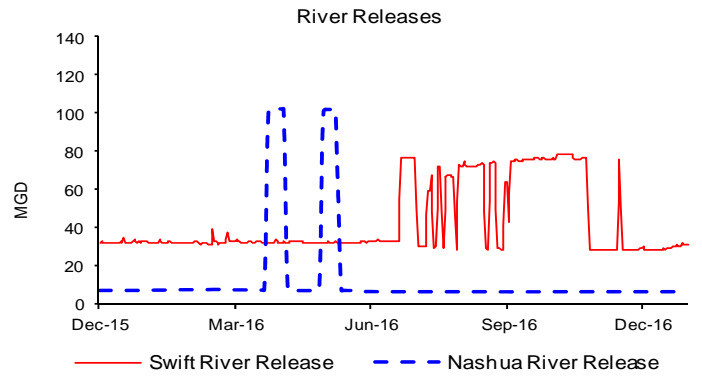
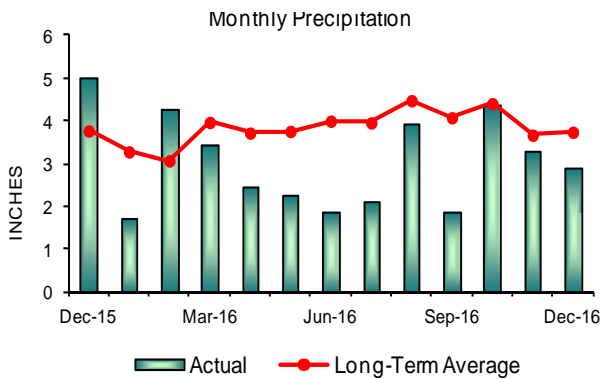
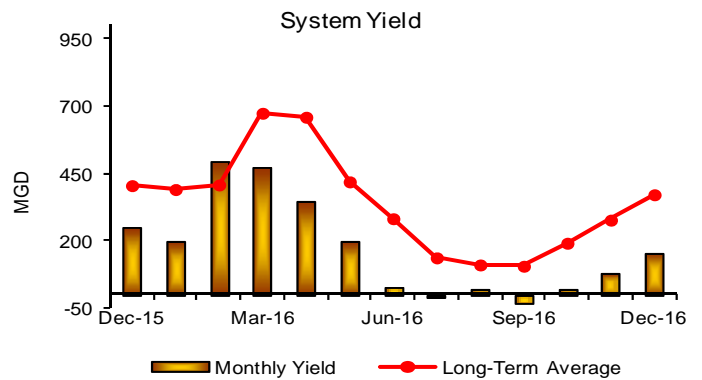
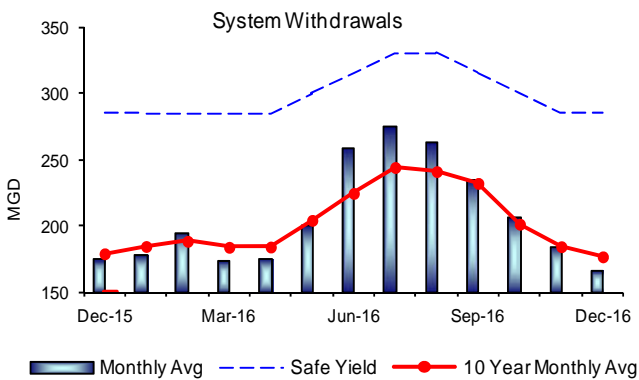
2nd Quarter – FY17

## 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 went into the Below Normal operating range in the month of November. The volume of the Quabbin Reservoir was at 79.1% as of December 31, 2016; a 3.4% decrease for the quarter, which represents a loss of about 14 billion gallons of storage. Yield and precipitation for the quarter were below their respective quarterly long term averages. System withdrawals for the quarter were below the 10 year monthly average.



# WASTEWATER QUALITY

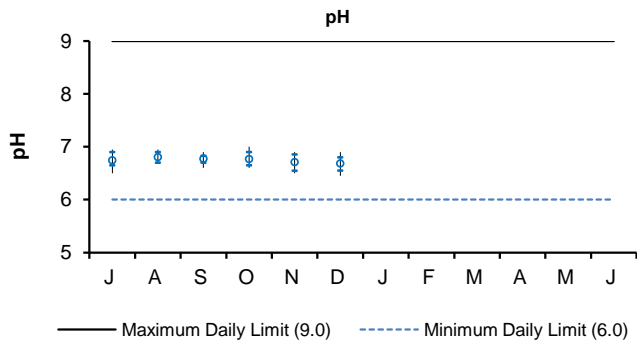


## NPDES Permit Compliance: Deer Island Treatment Plant 2nd Quarter - FY17

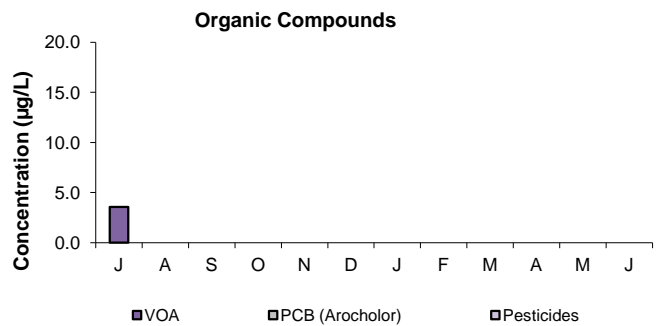
### NPDES Permit Limits

Effluent Characteristics		Units	Limits	October	November	December	2nd Quarter Violations	FY17 YTD Violations
Dry Day Flow:		mgd	436	254.2	255.0	256.1	0	0
cBOD:	Monthly Average	mg/L	25	6.4	6.4	7.1	0	0
	Weekly Average	mg/L	40	8.4	6.5	8.2	0	0
TSS:	Monthly Average	mg/L	30	7.4	8.2	7.9	0	0
	Weekly Average	mg/L	45	10.5	10.0	12.8	0	0
TCR:	Monthly Average	ug/L	456	<40	<40	<40	0	0
	Daily Maximum	ug/L	631	<40	<40	<40	0	0
Fecal Coliform:	Daily Geometric Mean	col/100mL	14000	7	6	7	0	0
	Weekly Geometric Mean	col/100mL	14000	17	8	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	6.6-7.0	6.6-6.9	6.5-6.9	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

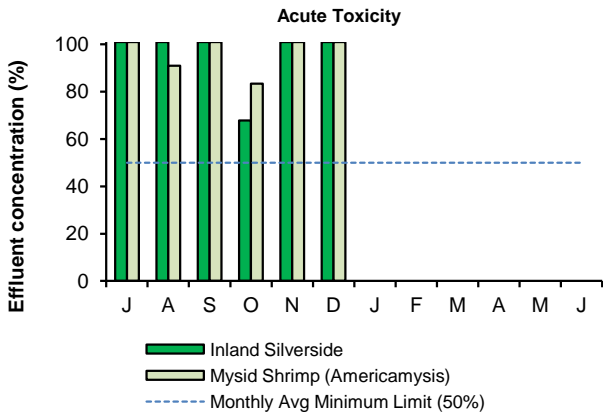
There have been no permit violations in FY17 to date at the Deer Island Treatment Plant.



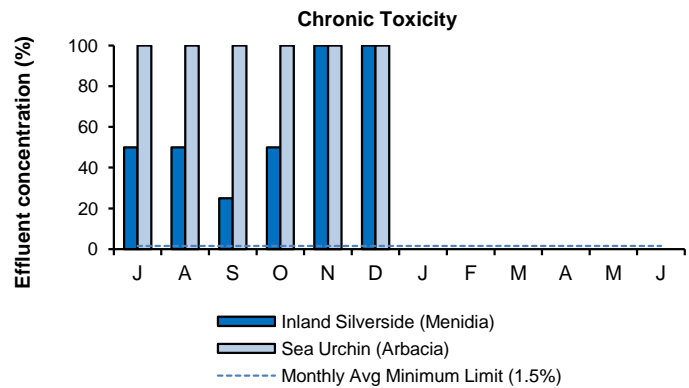
pH is a measure of alkalinity or acidity. Fluctuations in effluent pH are unlikely to impact on marine environments, which have significant buffering capacity. Because of the pure oxygen used in the activated sludge process, effluent pH tends to be at the lower end of the permit-required range. All pH measurements for the 2nd Quarter were within the daily permit limits.



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 2nd Quarter, all organic compounds were below the detection limit for the quarter.



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 2nd 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 2nd Quarter for both the inland silverside and sea urchin.

## NPDES Permit Compliance: Clinton Wastewater Treatment Plant 2nd Quarter - FY17

### NPDES Permit Limits

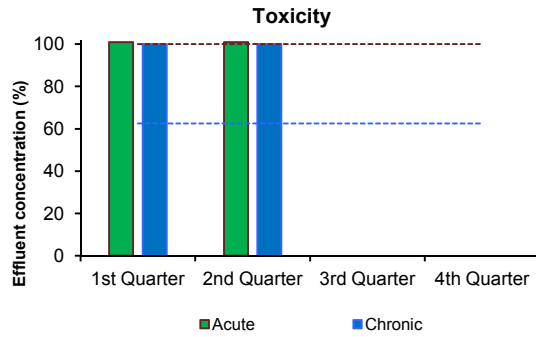
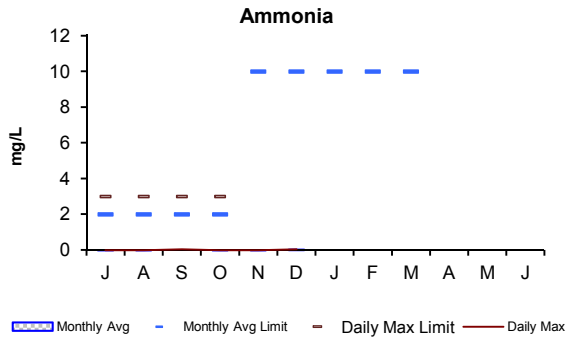
Effluent Characteristics	Units	Limits	October	November	December	2nd Quarter Violations	FY17 YTD Violations	
Flow:	mgd	3.01	2.30	2.27	2.24	0	0	
BOD:	Monthly Average:	mg/L	20	3.1	3.7	4.9	0	0
	Weekly Average:	mg/L	20	3.2	4.0	8.3	0	0
TSS:	Monthly Average:	mg/L	20	3.4	3.6	4.5	0	0
	Weekly Average:	mg/L	20	3.8	4.4	5.3	0	0
pH:	SU	6.5-8.3	7.2-7.9	7.3-7.6	7.0-7.6	0	0	
Dissolved Oxygen:	Daily Minimum:	mg/L	6	7.4	8.6	9.5	0	0
Fecal Coliform:	Daily Geometric Mean:	col/100mL	400	10	18	6	0	0
	Monthly Geometric Mean:	col/100mL	200	4	3	4	0	0
TCR:	Monthly Average:	ug/L	50	0	0.0	0.0	0	0
	Daily Maximum:	ug/L	50	0.0	0.0	0.0	0	0
Total Ammonia Nitrogen: November 1st - March 31st								
	Monthly Average:	mg/L	2.0	0.00	0.00	0.02	0	0
	Daily Maximum:	mg/L	3.0	0.00	0.00	0.04	0	0
Copper:	Monthly Average:	ug/L	20	7.6	7.7	6.9	0	0
Phosphorus: May 1 - Oct 31								
	Monthly Average:	mg/L	1.0	0.29	N/A	N/A	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	0

There have been no permit violations in FY17 at the Clinton Treatment Plant.

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

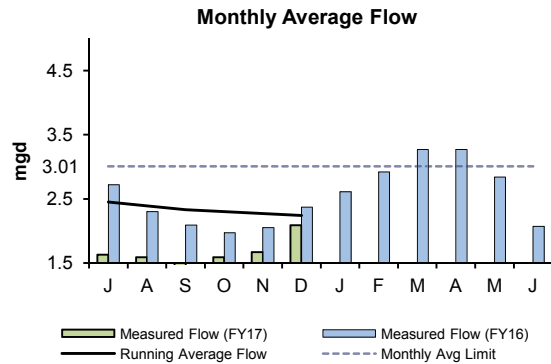
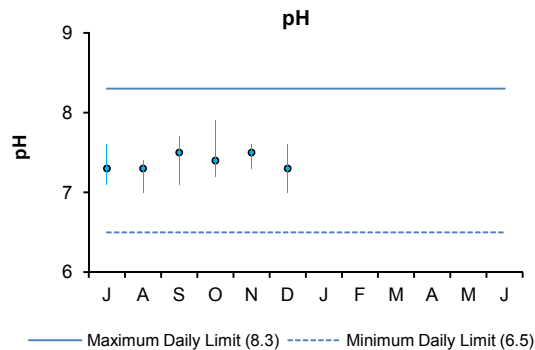
**2nd Quarter:** There were no permit violations in the second quarter.

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



The 2nd Quarter's monthly average and daily maximum concentrations were below the permit limits. The monthly average and daily maximum limits for the 2nd Quarter are 0.02 mg/L and 0.06 mg/L, 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. Toxicity limits were met during the 2nd Quarter.



pH is a measure of the alkalinity or acidity of the effluent. All daily pH results for the 2nd 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 Revenue Customers

### 2nd Quarter - FY17

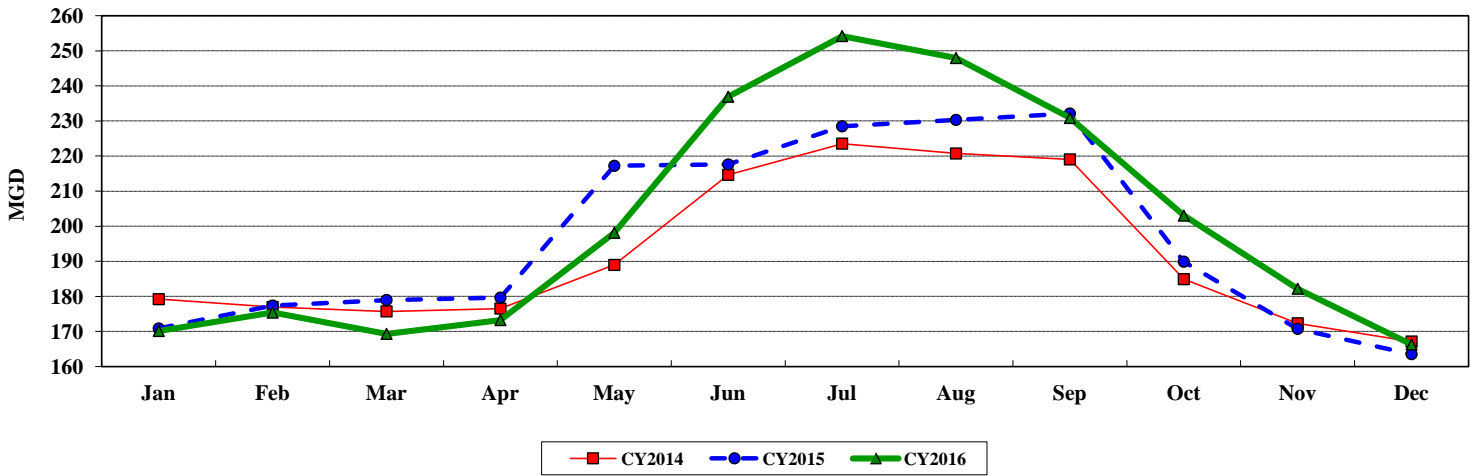
YTD CHANGES (CY16 vs. CY15)
Water Supplied
<b>2.1%</b>

**Water Supplied: All Revenue Customers**

MGD	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD Average	Annual Average
<b>CY2014</b>	179.212	176.987	175.736	176.536	188.974	214.660	223.544	220.734	219.049	184.918	172.333	167.145	191.729	191.729
<b>CY2015</b>	170.874	177.386	178.975	179.653	217.221	217.619	228.484	230.316	232.125	189.905	170.763	163.550	196.522	196.522
<b>CY2016</b>	170.144	175.389	169.319	173.256	198.133	236.921	254.203	247.944	230.859	203.031	182.197	166.310	200.724	200.724

MG	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD Total	Annual
<b>CY2014</b>	5,555.575	4,955.629	5,447.807	5,296.068	5,858.182	6,439.790	6,929.849	6,842.752	6,571.479	5,732.472	5,169.979	5,181.506	69,981.088	69,981.088
<b>CY2015</b>	5,297.089	4,966.801	5,548.216	5,389.596	6,733.842	6,528.559	7,082.997	7,139.787	6,963.760	5,887.062	5,122.884	5,070.040	71,730.633	71,730.633
<b>CY2016</b>	5,274.454	5,086.269	5,248.893	5,197.675	6,142.124	7,107.637	7,880.290	7,686.259	6,925.757	6,293.965	5,465.920	5,155.620	73,464.863	73,464.863

**MWRA Water Supplied: All Revenue Customers**



The December 2016 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 2016 water use will be used to allocate the FY18 water utility rate revenue requirement.

December 2016 water supplied of 166.3 mgd (for revenue generating users) is up 2.8 mgd or 1.7% compared to December 2015. December 2016 water use includes 1.2 mgd provided to the City of Cambridge and 0.6 mgd provided to the City of Worcester.

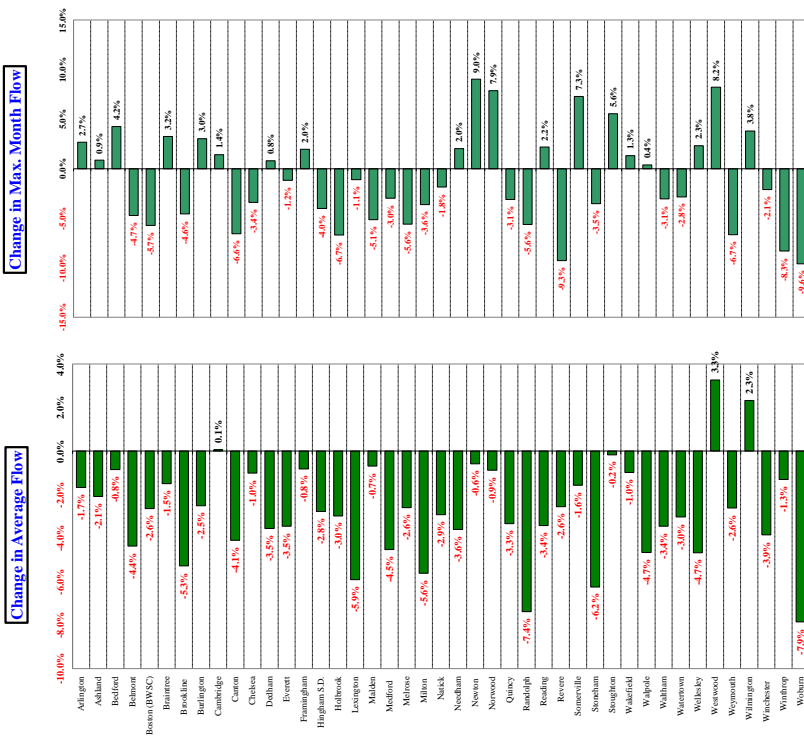
System-wide year to date consumption for CY16 was higher than CY15 with 200.7 mgd being supplied to MWRA customers **through December**. This is 4.2 mgd higher than CY15, and is an increase of 2.1%.

# Community Wastewater Flows

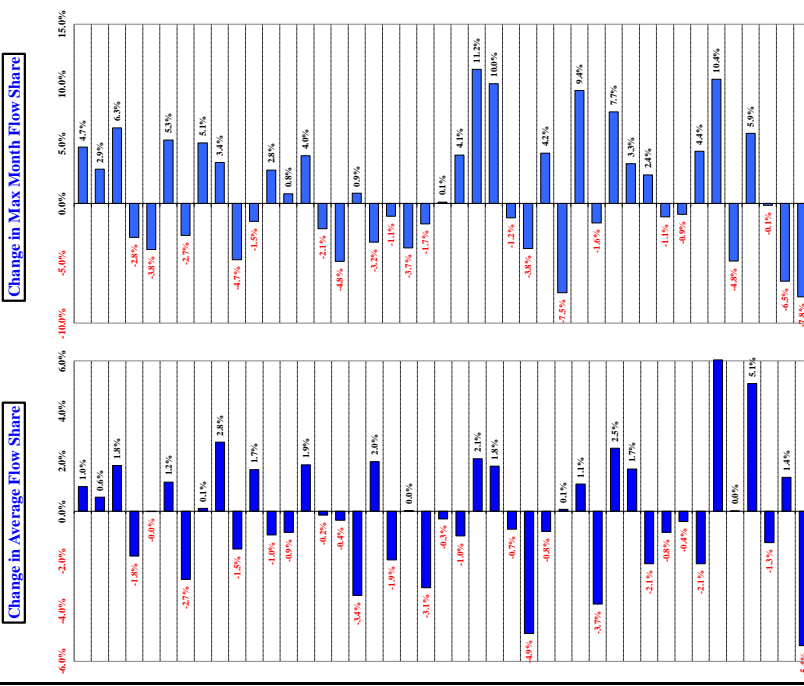
## 2nd Quarter - FY17

### How Projected CY2016 Community Wastewater Flows Could Effect FY2018 Sewer Assessments <sup>1,2,3</sup>

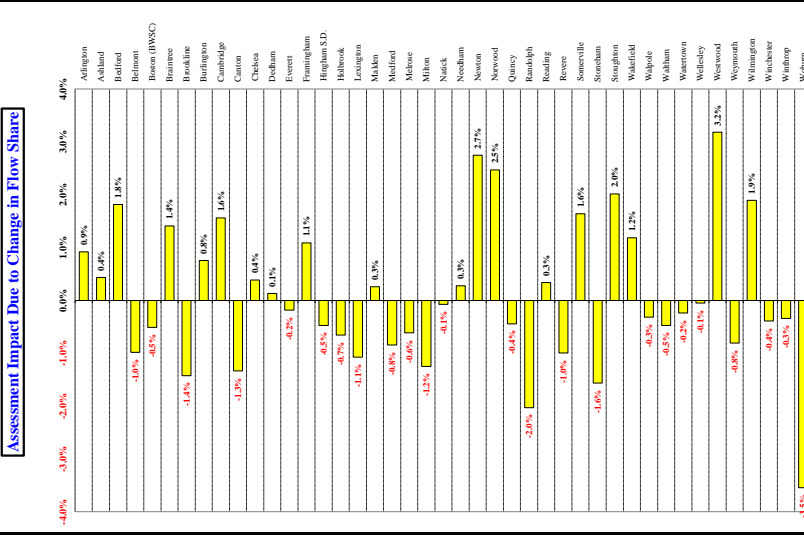
The flow components of FY2018 sewer assessments will be calculated using a 3-year average of CY2014 to CY2016 wastewater flows compared to FY2017 assessments that used a 3-year average of CY2013 to CY2015 wastewater flows.



But as MWRA's sewer assessments are a ZERO-SUM calculation, a community's assessment is strongly influenced by the RELATIVE change in CY2014 to CY2016 flow share compared to CY2013 to CY2015 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. <sup>4</sup>



Notes:  
<sup>1</sup> MWRA uses a 3-year flow average to calculate sewer assessments. Three-year averaging smooths 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.  
<sup>2</sup> Based on CY2013 to CY2016 average wastewater flows as of 12/12/16. Flow data is preliminary and subject to change pending additional MWRA and community review.  
<sup>3</sup> CY2013 to October CY2016 wastewater flows based on actual meter data. November to December 2016 flows based on the average of the prior three years.  
<sup>4</sup> Represents **ONLY** the impact on the total BASE assessment resulting from the changes in average and maximum wastewater **FLOW SHARES**.

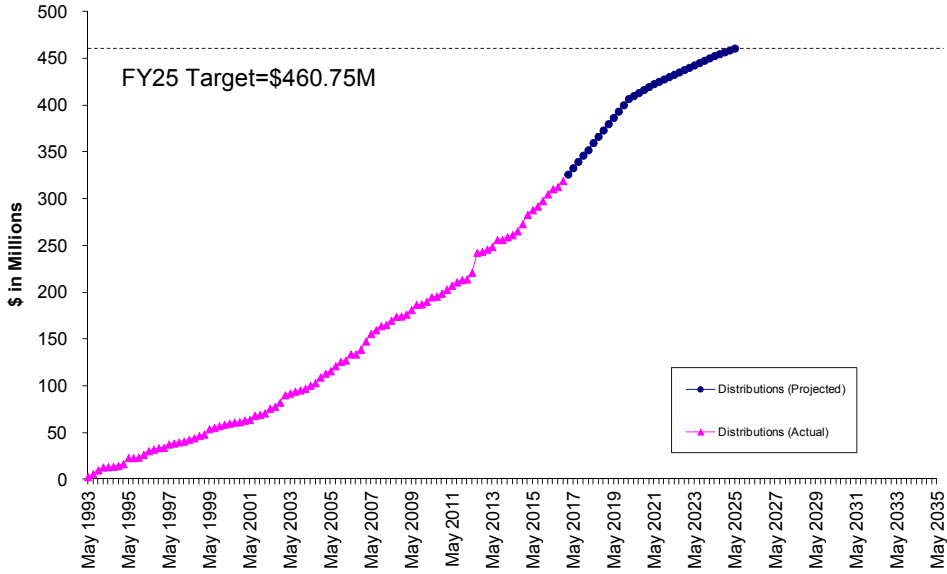
# Community Support Programs

2<sup>nd</sup> Quarter – FY17

## Infiltration/Inflow Local Financial Assistance Program

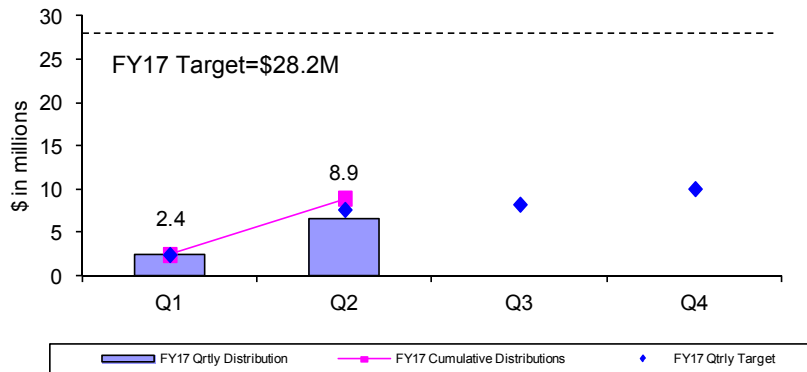
MWRA's Infiltration/Inflow (I/I) Local Financial Assistance Program provides \$460.75 million in grants and interest-free loans (average of about \$14 million per year from FY93 through FY25) to member sewer communities to perform I/I reduction and sewer system rehabilitation projects within their locally-owned 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 2<sup>nd</sup> Quarter of FY17, \$6.6 million in financial assistance (grants and interest-free loans) was distributed to fund local sewer rehabilitation projects in Ashland, Burlington, Framingham, Melrose, Quincy, Watertown and Wilmington. Total grant/loan distribution for FY17 is \$8.9 million. From FY93 through the 2<sup>nd</sup> Quarter of FY17, all 43 member sewer communities have participated in the program and more than \$319 million has been distributed to fund 518 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



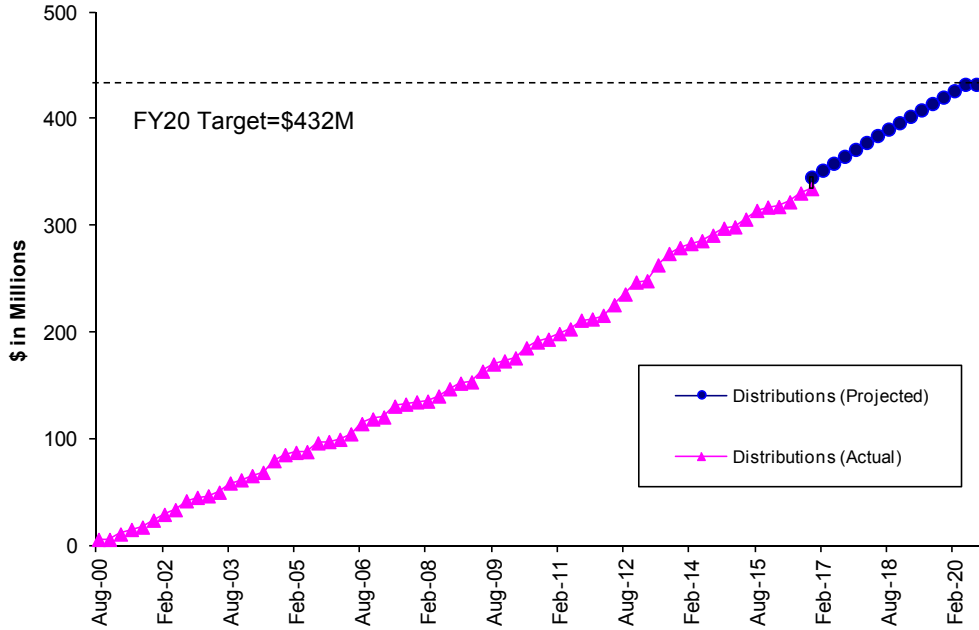
# Community Support Programs

2<sup>nd</sup> Quarter – FY17

## Local Water System Assistance Program

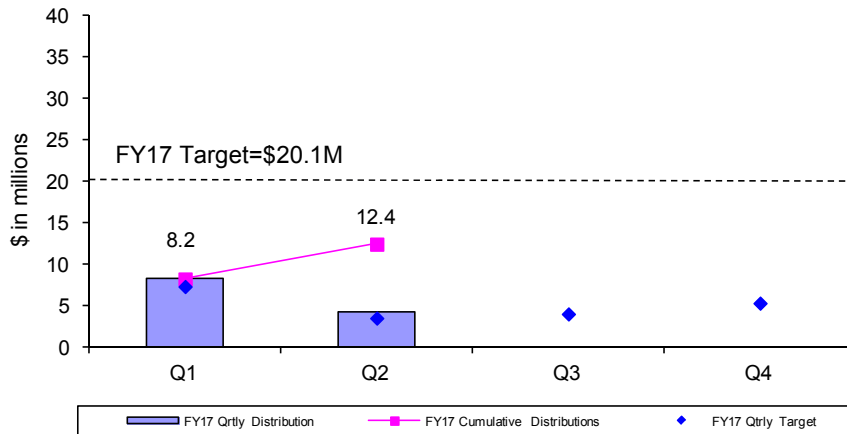
MWRA's Local Water System Assistance Programs (LWSAP) provides \$432 million in interest-free loans (an average of about \$22 million per year from FY01 through FY20) to member water communities to perform water main rehabilitation projects within their locally-owned water distribution systems. Eligible 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 2<sup>nd</sup> Quarter of FY17, \$4.2 million in interest-free loans was distributed to fund local water projects in Chelsea, Framingham, Newton and Watertown. Total loan distribution for FY17 is \$12.4 million. From FY01 through the 2<sup>nd</sup> Quarter of FY17, more than \$334 million has been distributed to fund 377 local water system rehabilitation projects in 38 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

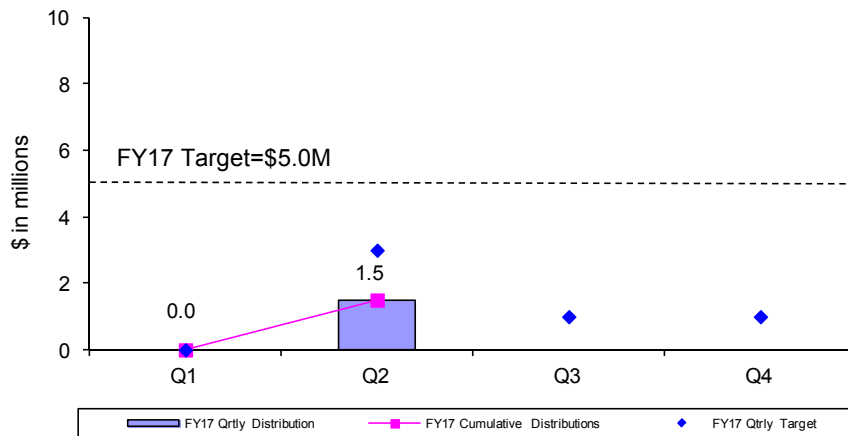
2<sup>nd</sup> Quarter – FY17

## 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 2<sup>nd</sup> Quarter of FY17, MWRA made the first Lead Loan Program distribution to Quincy for \$1.5 Million.

### FY17 Quarterly Distributions of Lead Service Line Replacement Loans



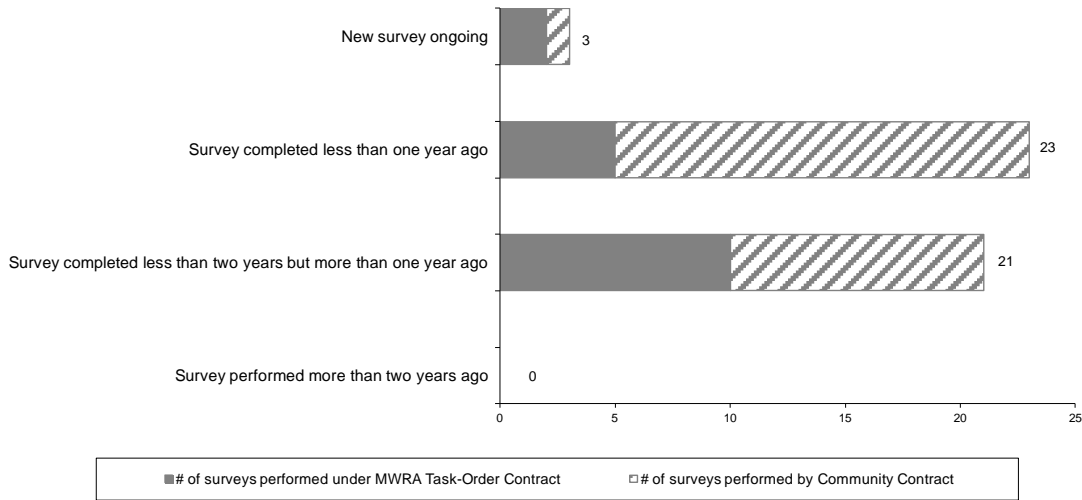


## Community Support Programs

2<sup>nd</sup> 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 2<sup>nd</sup> 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			21,102
Low-Flow Fixtures (showerheads and faucet aerators)	10,000	3,162	1,944			5,106
Toilet Leak Detection Dye Tablets	-----	2,265	2,814			5,079

## BUSINESS SERVICES

# Procurement: Purchasing and Contracts

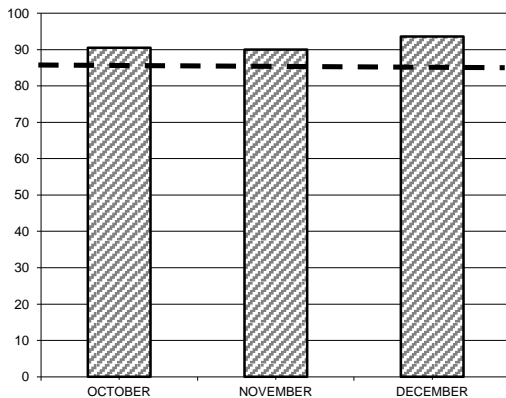
## Second Quarter - FY17

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

**Outcome:** Processed 94% of purchase orders within target; Average Processing Time was 4.97 days vs. 4.92 days in Qtr 2 of FY16. Processed 76% (13 of 17) of contracts within target timeframes; Average Processing Time was 122 days vs. 72 days in Qtr 2 of FY16.

### Purchasing

Purchase Orders - Percent in Target



	No.	TARGET	PERCENT IN TARGET
\$0 - \$500	734	3 DAYS	87.6%
\$500 - \$2K	752	7 DAYS	94.9%
\$2K - \$5K	397	10 DAYS	94.2%
\$5K - \$10K	69	25 DAYS	89.8%
\$10K - \$25K	67	30 DAYS	82.0%
\$25K - \$50K	15	60 DAYS	80.0%
Over \$50K	29	90 DAYS	86.2%

The Purchasing Unit processed 2063 purchase orders, 297 less than the 2360 processed in Qtr 2 of FY16, for a total value of \$14,165,441 versus a dollar value of \$21,846,994 in Qtr 2 of FY16.

The purchase order processing target was not met for the \$10K - \$25K category due to sole source documentation requirements and extensions of the bid date; and the \$25K - \$50K category due to end user bid evaluations.

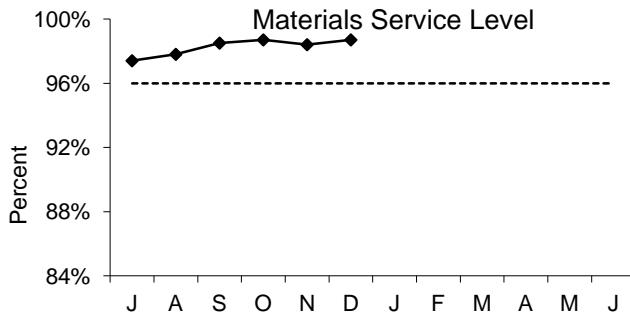
### Contracts, Change Orders and Amendments

Four contracts were not processed within the target timeframes. One due to extensive revisions of the contract documents prior to bid required to address design issues and numerous bidder questions; another due to requirements to align the contract with the start of the associated construction contract as this contract provided the Resident Engineer/Inspector for the project; a third due to prolonged consultant turnover time for requested revisions to the contract specifications; and the fourth due to extended contract negotiations with the consultant (new contract in place prior to the expiration of the existing contract).

Procurement processed seventeen contracts with a value of \$84,068,927 and nine amendments with a value of \$591,144. Twenty three change orders were executed during the period. The dollar value of all non-credit change orders during the 2nd quarter FY17 was \$1,419,910 and the value of credit change orders was (\$19,686).

Staff reviewed 55 proposed change orders and 33 draft change orders.

## Materials Management 2nd Quarter, FY17



The service level is the percentage of stock requests filled. The goal is to maintain a service level of 96%. Staff issued 8,468 (98.6%) of the 8,588 items requested in Q2 from the inventory locations for a total dollar value of \$1,010,937.

### 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 – couplings and leak detectors for HVAC; sealing bands, coupling elements, terminator cap and pump rotor for Residuals; sensors and input modules for I&C; plug valve and grease for Liquid Train; loop indicator for Power & Pump; transformer, wire, relays, insulation washers and tubes, fuses and diodes for Electrical.
- Chelsea – mirrors, fuel injector pipe, calipers and connectors for Fleet Services; washer, refrigerator and mechanical seals for Field Operations; PLC processor, PLC cards, control relays and power supplies for Engineering and Construction; switches, transducers, receptacles and lamps for Metro Maintenance; docking station and converters for SCADA.
- Southboro – padlocks for Equipment Maintenance; loop isolators for Quality Assurance; hand warmers for Maintenance.

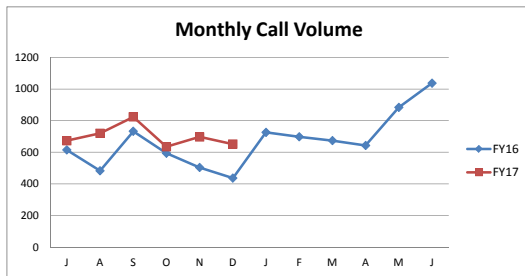
Property Pass Program:

- Nine audits were conducted during Q2.
- Scrap revenue received for Q2 amounted to \$10,247. Year to date revenue received amounted to \$14,987.
- Revenue received from online auctions held during Q2 amounted to \$112,877. Year to date revenue received amounted to \$173,807.

Items	Base Value July-16	Current Value w/o Cumulative New Adds	Reduction / Increase To Base
Consumable Inventory Value	8,108,240	7,929,900	-178,340
Spare Parts Inventory Value	8,841,332	8,831,754	-9,578
Total Inventory Value	16,949,572	16,761,654	-187,918

**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.

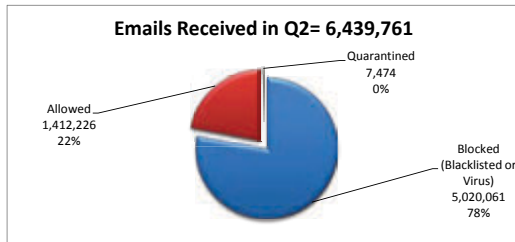
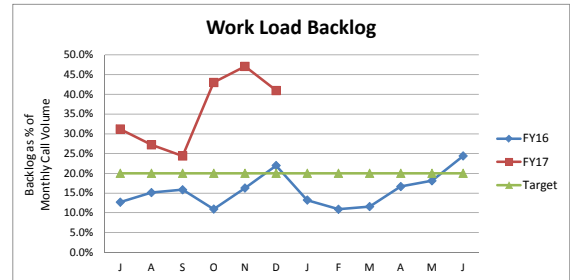
## MIS Program 2nd Quarter FY17



### Performance and Backlog

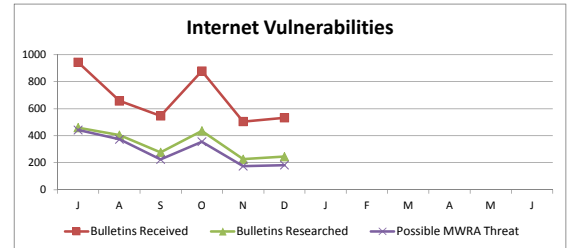
**Call Volume:**  
Peaked in November. FY17-Q2 call volume increased by 29% from FY16-Q2.

**Call Backlog:**  
Peaked in November. FY17-Q2 backlog average is 23.7% above the targeted benchmark of 20%. There were 193 additional helpcalls vs. Nov 2015. Backlog also attributed to Laptop Validation, iPhone Rollout and Surface Tablet projects.



### Information Security

During Q2, pushed security fixes/updates to desktops/ servers to protect against 318 vulnerabilities. LANDesk Antivirus quarantined 20 distinct viruses from 13 PCs. PCs are current with anti-virus providers' signatures for all known malware.



### Infrastructure:

#### Citrix Mobile Application Design and Development:

Upgraded XenMobile infrastructure to support iOS10. Expanding use of Sharefile to Procurement. Began build out of Virtual Desktop Infrastructure

### Applications/Training/Records Center:

**Library Catalog Replacement Project (InMagic):** Went live with the new Library Resources Portal and ran brown bag user training sessions at various locations. Installed a development server and synchronized the development and production servers. Adjusted Library location values across newly merged record types to suit display and label requirements and made various configuration changes to fine-tune the user experience. Ordered new barcode scanner, selected label stock and designed label layouts for book spine and card printing to re-label and re-shelve books. Created a 2 page Quick Reference Card for the go-live announcement based on the 27 page user guide.

**Miscellaneous Lawson Support:** Installed/tested a new Disaster Recovery micro check printer for the Payroll and AP check applications on Deer Island. Upgraded the MUNEASE Bond Tracking application and SQL Server database. Scheduled and held six days of training and configuration workshops with the Portia vendor and users.

**Lawson-Maximo Interface:** MWRA and Vendor integration testing results have 50 of 51 interfaces and 10 of 12 bulk load import programs successfully passing; the remaining program/interface testing continues. User Interface Acceptance testing is underway.

**Information Security Program:** Concluded User Security Awareness Training. 76% of all employees completed all training modules. A second phishing assessment was conducted. 30% fewer employees fell victim to this phishing attempt than the prior year. As a result, MIS will pursue continuing this training along with revising and enhancing internal procedures.

**Maximo Upgrade Project:** Maximo 7.6 Go-live date scheduled in January 2017. Conducted IBM Control Desk (ICD) workshops for end users and completed Integration Testing of the Lawson interface.

**Electronic Library Notebook (ELN):** Deployed 15 ELN logs in production for Chelsea Laboratory Experiment. Began work on ELN logs Quabbin Laboratory.

**LIMS:** Prepared responses for LIMS Data Reliability Assessment conducted by State Auditor's office.

**PIMS/CromERR:** Discussed next steps to implement PIMS CromERR internally and with EPA.

**Library & Records Center:** The Library fulfilled 58 research requests, and provided 266 periodicals, standards, books & reports. Research topics included chlorate, bromated and estrogens in drinking water and historic navigation. The Records Center added 243 boxes, handled 350 boxes, disposed of 342 boxes and attended three Records Conservation Board Meetings.

**IT Training:** For the quarter, 639 staff attended 62 classes. 47% of the workforce has attended at least one class year-to-date. 492 staff completed Maximo 7.6 training. A new Maximo Self Service Quick Reference Card was developed and published and a brown bag demo was presented to Chelsea Operations field staff. A new Introduction to Maximo class is under development.

# Legal Matters

2nd Quarter - FY17

## PROJECT ASSISTANCE

### COURT AND ADMINISTRATIVE ORDER

- **Boston Harbor Litigation and CSO:** Reviewed and Filed Semi-Annual Compliance and Progress Report.
- **Administrative Consent Order (DITP power outages):** Reviewed and submitted updated semi-annual *Consultant's Deer Island Energy Recommendations Tracking Sheet* to DEP and EPA for ACOP-NE-04-1N003-SEP.

### REAL ESTATE, CONTRACT AND OTHER SUPPORT

- **Regulations:** Reviewed and provided comments on Mass DAR's revised 330 CMR 31.00 regulations relating to plant and nutrient application requirements for agricultural land for non agricultural land and non agricultural turf and lawn. Reviewed and revised comments on EPA's proposed information collection request for the national study on nutrients removal and secondary technologies. Reviewed Massachusetts Contingency Plan notification provisions relative to sampling results from a DEP monitoring well near the Wachusett Aqueduct in Northborough.
- **Real Property:** Drafted letter notifying MassDOT that MWRA was vacating the Commercial Point CSO Facility chemical building site and returning it to MassDOT. Coordinated with MBTA to access two MWRA manholes within MWRA easement on MBTA property. Confirmed that proposed taking by MassDOT along Route 9 in Wellesley did not affect property under MWRA's care custody and control. Reviewed MWRA's property rights for parcels of land located at Marginal and Chelsea Street in Chelsea and for 51 Fairmont Court in Hyde Park. Drafted easement language needed for the relocation of a portion MWRA's Northern High Service Pipeline Section 14 water main from Pleasant Street Extension to Pleasant Street in Malden. Reviewed and provided comments on draft estoppel certificate and subordination, attornment and non-disturbance agreement relative to MWRA's lease of a portion of Building 39 in CNY.
- **NPDES:** Reviewed and provided comments on letter to EPA seeking revisions to MWRA's outfall contingency plan. Reviewed and provided comments on letter transmitting scope of CSO variance monitoring in the Lower Charles River/Charles Basin and the Alewife Brook/Upper Mystic River to EPA and DEP. Reviewed and provided comments on notification letter to EPA relative to DITP's operation of its back up power during periods when the HEEC power cable, which provides primary power to DITP, is off-line. Reviewed applicability of noncontact cooling water NPDES permit to MWRA's Wachusett Aqueduct pumping station future geothermal discharge to forebay. Reviewed and provided comments on notification letter to EPA relative to DITP's operation of its back up power during periods when the HEEC power cable, which provides primary power to DITP, is off-line.
- **Watershed Preservation Restriction:** Reviewed Wachusett Reservoir Watershed Acquisition W-000494 located at Upper North Row Road and Hardscrabble Road, in Sterling, MA. Reviewed Quabbin Reservoir Watershed Acquisition W-0001175 located at Hardwick Road in Petersham, MA.
- **Order of Conditions:** recorded extension permit for order of conditions DEP 297-0353 related to MWRA Spot Pond Covered Storage contract 6457.
- **Licenses:** Finalized Mass DOT license for MWRA's use of land in Weston near shaft 5 and shaft 5A for parking and a lay down area needed for the repair of water line Section 80. Finalized MIT Sea Grant College Program for MIT's use of the Deer Island Wastewater Treatment Plant (DITP) Pier. Reviewed and revised draft license agreement related to Boston Gas's (NGRID) gas line and meters being installed at MWRA's Clinton Wastewater Treatment Plant.
- **8(m) Permits:** Reviewed and approved fifty-seven (57) 8(m) permits.
- **Public Records Requests:** Provided responses to one public records request.
- **Greater Esker Park:** Filed MWRA's Third/Final Annual Compliance/Monitoring Report.
- **FST/Stantec Cost Recovery:** Assisted staff with structuring cost recovery settlement to permit set-off against FST claims for additional work. Obtained extension to tolling agreement.
- **CNY Lease:** Provided documentation to CNY landlord concerning landlord's property refinancing.
- **Amended Public Records Law:** Provided assistance to MIS, Operations and Executive Office in implementing amended Public Records Law which became effective on January 1, 2017. Revised MWRA Admin. Policy #19.
- **West Boylston Municipal Lighting Plant:** Met with energy consultant and answered WBMLP's offer to enter into a long term agreement for the purchase of Oakdale output.

### MISCELLANEOUS

## LABOR, EMPLOYMENT AND ADMINISTRATIVE

**New Matters** -- One demand for arbitration was filed.

## LABOR, EMPLOYMENT AND ADMINISTRATIVE (cont.)

### Matters Concluded

- Received an arbitrator's decision in favor of MWRA finding that the MWRA did not violate a collective bargaining agreement when an employee claimed to be working out of title.
- Received an arbitrator's decision in favor of MWRA finding that the MWRA did not violate a collective bargaining agreement when an employee claimed to be working out of title.
- Received a dismissal from the MCAD for lack of probable cause of a charge of discrimination on the basis of race, color.
- 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

- Joel Chiet (Motor Vehicle Accident): Mr. Chiet, an 80-year old resident of Everett, has initiated a claim arising out of an auto accident that occurred on June 29, 2015 on the Fellsway in Medford. Chiet alleges that he was stopped at a red light when his vehicle was rear ended by an MWRA truck operated by MWRA employee Mark Cataldo. Mr. Cataldo had also been stopped at the light, but reportedly his vehicle rolled approximately ten feet into the rear of Chiet's vehicle. Chiet alleges hip, shoulder and back pain and received medical treatment as well as physical therapy. No lawsuit has yet been filed, but Chiet has legal counsel with whom Law Division will pursue settlement discussions.
- Besnick Lalaj and Violeta Lalaj (Motor Vehicle Accident): Mr. and Mrs. Lalaj are represented by Attorney William Reitzell in connection with an auto accident that occurred on November 10, 2015, at approximately 6:15 a.m., on Mystic Avenue in Somerville, near MWRA's CSO facility. Mr. Lalaj contends that he was traveling on Mystic Avenue, when an MWRA vehicle pulled out of a "construction area" and hit the driver's side of Mr. Lalaj's vehicle. Mr. Lalaj saw the license plate and reported the incident by telephone to the Somerville Police. Mr. Lalaj, who is 47 years old, alleges injuries to his neck and back, and medical expenses of approximately \$5,000.00. Mrs. Lalaj, the passenger, who is 41 years old, alleges injuries to her neck, back and right knee, and medical expenses of \$4,757.00. Settlement discussions will be pursued in this matter.
- Thang Viet Vu and Oanh Vu (Motor vehicle Accident): On December 1, 2015, MWRA employee Mark Enos was travelling in an MWRA vehicle on Gallivan Boulevard, approaching Granite Avenue in Quincy, when he collided with the vehicle in front of him, operated by Mr. Vu. Mr. Vu's vehicle had stopped abruptly to avoid hitting the vehicle in front of him that had suddenly attempted an illegal left turn onto Granite Avenue. Mr. Vu is 65 years old; Ms. Vu, the passenger, is 27 years old. Both claimants are represented by Attorney Brian Gunning of Dorchester and settlement discussions will be pursued.
- Service of Process Matter: On December 13, 2016, the Law Division received a telephone call from a woman who claimed to be a process server, employed by a California attorney, who was attempting to contact an MWRA employee before possibly serving the employee with legal process at MWRA. She stated that she had tried unsuccessfully three times to serve the employee at his home. The process server would not divulge her last name or the nature of the matter about which she was calling. Law Division contacted the employee and relayed the substance of the telephone call. The employee said he had received calls at home concerning an unspecified account, with directives to pay, but he has never received any documents substantiating the allegedly past due account and otherwise is not aware of any account on which he is indebted. The employee knows not to make any payments solicited in this manner. Law Division advised the employee that he would be notified in the event of any further contact from the process server or the alleged creditor, including service on MWRA of any legal papers pertaining to him.

**Significant Claim Not in Court** There are no Significant Claims.

### Significant Developments

- Daniel O'Connell's Sons v. MWRA v Allied-Locke Industries, Inc.: In late December 2016 following Board authorization to settle, this matter was settlement for a payment to O'Connell's of \$2.65 million. A memorandum agreement was signed on December 22, 2016.
- United States (Army Corps) v. NSTAR, HEEC and MWRA: MWRA prevailed on the motion, brought by HEEC and NSTAR, to dismiss MWRA's cross-claims. In particular, MWRA's indemnification claims in its cross-claims will be the primary basis upon which MWRA will proceed to argue that NSTAR and HEEC have responsibility for all expenses arising out of the mis-positioned cable. MWRA also prevailed on the motion, brought by the United States, for summary judgment on issues of liability for the alleged failure to comply with the depth requirements of the ACoE dredging permit. That denial, which was without prejudice, allows all parties to pursue discovery. Finally, MWRA substantially prevailed in the DPU tariff proceeding in that DPU rejected HEEC's theory that the expiration of the 1990 Interconnection Agreement meant that its provisions relating to construction cost caps would no longer have any application under the new tariff. DPU re-drafted many of the tariff terms and conditions proffered by HEEC to make them neutral relative to future cable expenditures. DPU also indicated that either a court or the DPU could decide any dispute about cable protection costs.
- MWRA Law Division staff completed review of Boston Harbor Project archived files and culled out approximately 4,500 pages of documents in response to the document request of HEEC/NStar. Reviewed and filed MWRA's Answer to HEEC/NStar's cross-claims against MWRA.
- HEEC Tariff Proceeding (MA DPU 15-157): DPU issued its lengthy decision on most open tariff issues ruling substantially in MWRA's favor on disputed issues including the term and conditions of service and prohibiting HEEC from charging MWRA for any extraordinary cable protection costs, and ruling that the disputes underlying such costs could be adjudicated by a court, by DPU or could be resolved by the future agreement of MWRA and HEEC.

**Significant Developments (cont.)**

- Bay State Regional Contractors, Inc. v. MWRA: Concluded agreement to allow MWRA to disburse payment to J.F. White from amounts withheld under contract 7260 and to treat the payment as a credit against sums claimed to be due to Bay State in Superior Court suit.

**Matters Concluded**

- OPK Biotech LLC: On December 9, this Chapter 7 Bankruptcy matter closed once a dividend payment on MWRA's claim from the Interim Distribution was filed. MWRA received a payment in the amount of \$1,077.90.
- Implant Services: This was a small TRAC customer that filed for Chapter 11 Bankruptcy in October 2016. It was determined that MWRA did not have a claim.

**Subpoenas-**

- During the Second Quarter of FY 2017, no new subpoenas were received and no subpoenas were pending at the end of the Second Quarter FY 2017.

**Public Records**

- During the Second Quarter of FY 2017, eight public records requests were received, two were withdrawn and four public records requests were closed.

**SUMMARY OF PENDING LITIGATION MATTERS**

TYPE OF CASE/MATTER	As of Dec 2016	As of Sept 2016	As of June 2016
Construction/Contract/Bid Protest (other than BHP)	3	3	5
Tort/Labor/Employment	1	1	1
Environmental/Regulatory/Other	2	2	2
Eminent Domain/Real Estate	0	0	0
<b>total – all defensive cases</b>	<b>6</b>	<b>6</b>	<b>8</b>
Other Litigation matters (restraining orders, etc.) <u>MWRA v. Thomas Mercer</u> <u>MWRA v. NSTAR and HEEC</u>	2	2	2
<b>total – all pending lawsuits</b>	<b>8</b>	<b>8</b>	<b>10</b>
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	0	0
Bankruptcy	1	2	2
Wage Garnishment	14	14	14
TRAC/Adjudicatory Appeals	0	0	2
Subpoenas	0	0	0
<b>TOTAL – ALL LITIGATION MATTERS</b>	<b>26</b>	<b>24</b>	<b>28</b>

**TRAC/MISC.**

**New Appeals** No new cases were received.

**Settlement by Agreement of Parties**  
No Settlements by Agreement of Parties.

**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 Decisions** No Tentative Decisions were issued in the 2nd Quarter FY 2017.

**Final Decisions** No Final Decisions was issued in the 2nd Quarter FY 2017.



**INTERNAL AUDIT AND CONTRACT AUDIT ACTIVITIES**  
2<sup>nd</sup> Quarter - FY17

**Highlights**

During the 2<sup>nd</sup> quarter, Internal Audit (IA) completed 5 construction labor burden reviews, 1 consultant preliminary review and 5 incurred cost audits. A change order pricing analysis and a vendor review were also completed. An audit of the Wright Express Retail Fuel Card Program was performed to determine if current controls over fuel purchases and invoice payments are adequate and comply with current policies and procedures. General management advisory services included sole source award analysis, labor rates on professional services contracts and assistance in contract negotiations.

**Status of Recommendations**

There were 25 recommendations made in FY17 and 14 of these have been closed year to date. An additional 11 recommendations were closed from prior fiscal year audits.

IA follows-up on open recommendations on a continuous basis. All open recommendations have target dates for implementation. When a recommendation has not been acted on 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 dates)	Audit Recommendations		
	Total	Closed	Open
Hardware Equipment Management Report (5/22/13)	36	32	4
Follow-Up Report on Fleet Services Activities (12/31/13)	17	13	4
8(m) Permit Fees (11/17/14)	6	4	2
Records Management (12/5/14)	8	6	2
Unmatched Receipts and Accruals (6/30/15)	10	5	5
Halon Inspections at DITP (9/30/15) & Caruso and DeLauri (12/31/15)	18	16	2
Warehouse Cycle Counts at DITP (11/5/15), Southboro (11/6/15) and Chelsea (12/4/15)	25	20	5
Security System Alarms (3/3/16)	3	1	2
AVL Tracking 2016 (5/6/16)	9	7	2
MIS Mobile Equipment Asset Tracking (9/26/16)	12	11	1
Wright Express (WEX) Fuel Card Purchases (11/16/16)	13	3	10
<b>Total Recommendations</b>	<b>157</b>	<b>118</b>	<b>39</b>

**Cost Savings**

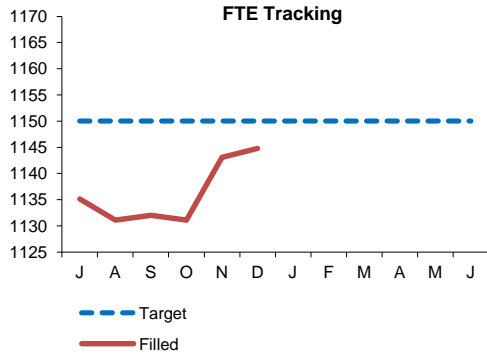
IA's target is to achieve at least \$1 million in cost savings each year. Cost savings vary each year based upon many factors. In some cases, cost savings for one year may be the result of work in prior years.

Cost Savings	FY13	FY14	FY15	FY16	FY17 (2Q)	TOTAL
Consultants	\$587,314	\$294,225	\$87,605	\$88,312	\$93,349	\$1,150,805
Contractors & Vendors	\$2,153,688	\$415,931	\$1,146,742	\$1,772,422	\$2,141,609	\$7,630,392
Internal Audits	\$391,083	\$923,370	\$543,471	\$220,929	\$109,452	\$2,188,305
<b>Total</b>	<b>\$3,132,085</b>	<b>\$1,663,526</b>	<b>\$1,777,818</b>	<b>\$2,081,663</b>	<b>\$2,344,410</b>	<b>\$10,969,502</b>

## OTHER MANAGEMENT

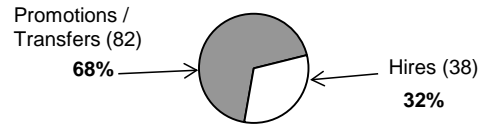
# Workforce Management

## 2nd Quarter - FY17



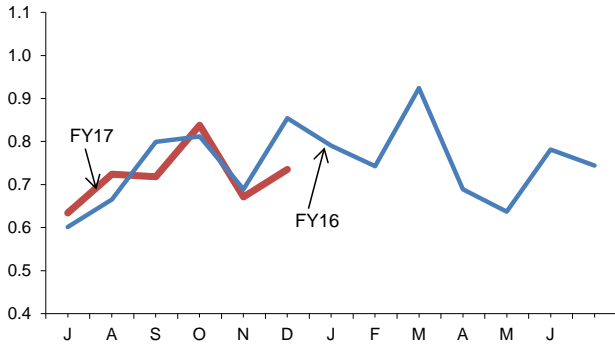
FY17 Target for FTE's = 1150  
 FTE's as of Dec 2016 = 1144.8

**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	82 (68%)	38 (32%)	120

**Average Monthly Sick Leave Usage**  
 Per Employee



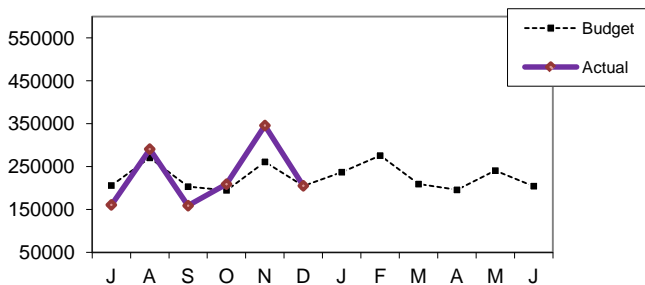
Average monthly sick leave for the 2nd Quarter of FY17 decreased as compared to the 2nd Quarter of FY16 (9.42 to 8.98 days)

In Q2 of FY17, the average quarterly sick leave usage decreased 4.7% from the same time last year.

	Number of Employees	YTD	Annualized Total	Annual FMLA %	FY16
Admin	140	3.76	7.51	13.9%	8.29
Aff. Action	5	2.91	5.83	0.0%	8.05
Executive	5	9.07	18.13	57.4%	10.97
Finance	35	4.27	8.54	32.5%	9.70
Int. Audit	7	2.84	5.69	69.1%	4.44
Law	16	4.62	9.25	5.9%	11.41
OEP	8	3.10	6.20	57.1%	6.62
Operations	930	4.42	8.83	18.6%	9.06
Pub. Affs.	14	3.54	7.08	9.7%	9.16
<b>MWRA Avg</b>	<b>1160</b>	<b>4.32</b>	<b>8.64</b>	<b>18.9%</b>	<b>8.99</b>

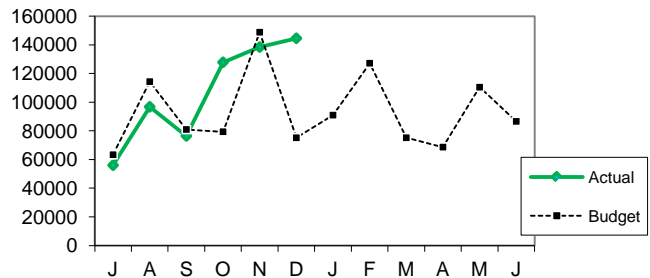
Percent of sick leave usage for FY17, attributable to Family and Medical Leave Act (FMLA) is 18.9% .

**Field Operations**  
 Current Month Overtime \$



Total Overtime for Field Operations for The Second Quarter of 2016 was \$769,290 which is \$109k over budget. Emergency overtime was \$290k, which was (\$9k) under budget. Rain events totaled \$147, emergency maintenance was \$42k, emergency operations was \$27k, and snow removal was \$15k. Coverage overtime was \$147k, which was \$25k over budget, reflecting the shift coverage requirements for the quarter. Planned overtime was \$332k or \$83k over budget. Spending for the quarter includes maintenance off-hours work at \$117k, maintenance work completion at \$36k, Planned operations at \$30k, half-plant at Carroll at \$40k. YTD, FOD has spent \$1,371,643 on overtime which is \$30k over budget.

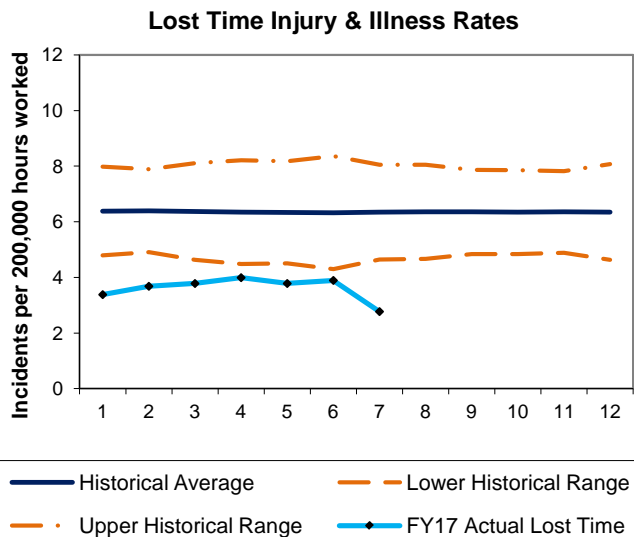
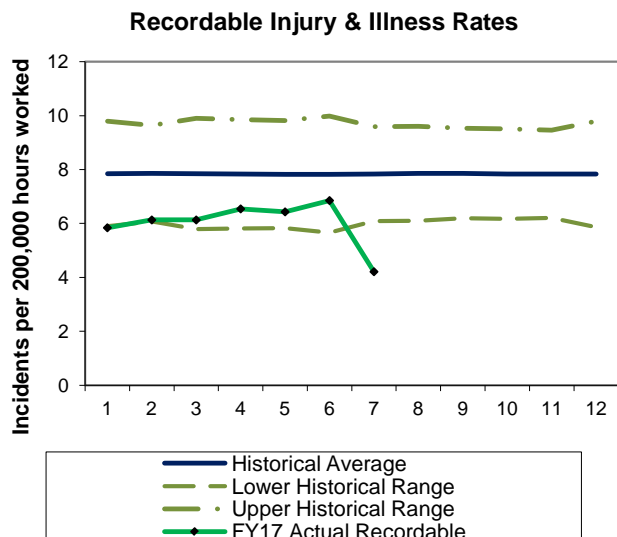
**Deer Island Treatment Plant**  
 Current Month Overtime \$



Total overtime for Deer Island for the second quarter of FY17 \$410K, which was \$107K over budget. A combination of planned/unplanned overtime which was \$155K over budget mainly due to maintenance and operations activities involving the Eversource cable outage and HVAC work during the power plant outage, and higher shift coverage overtime, \$43K over budget, due to several vacant operator positions. This is offset in part by, less than anticipated storm coverage overtime, (\$91K) or (1,756) fewer hours. YTD, Deer Island has spent \$640,098 on overtime which is \$78K over budget.

# Workplace Safety

2nd 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 Claims Highlights - 2nd Quarter FY17

	New	Closed	Open Claims
Lost Time	4	9	60
Medical Only	23	16	23
Report Only	5	9	
	New		YTD Light Duty Returns
Regular Duty Returns	8		8
Light Duty Returns	2		5

### Highlights/Comments:

- Light Duty Returns

**October**

**November** Two employees Returned to Light Duty

**December**

- Regular Duty returns

**October**

**November** One employee returned to regular duty from IA

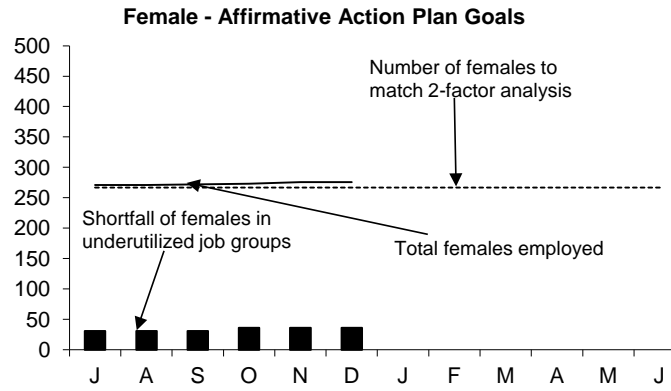
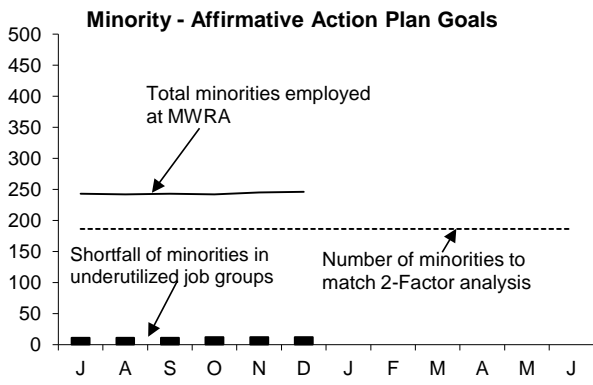
**December**

**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**  
2nd Quarter - FY17



**Highlights:**

At the end of Q2 FY17, 4 job groups or a total of 12 positions are underutilized by minorities as compared to 11 job groups or a total of 44 positions at the end of Q2 FY16; for females 9 job groups or a total of 36 positions are underutilized by females as compared to 10 job groups or a total of 43 positions at the end of Q2FY16. During Q2, 6 minority and 6 female were hired. During this same period 3 minorities and 4 female terminated.

**Underutilized Job Groups - Workforce Representation**

Job Group	Employees as of 12/31/2016	Minorities as of 12/31/2016	Achievement Level	Minority Over or Under Underutilized	Females As of 12/31/2016	Achievement Level	Female Over or Under Underutilized
Administrator A	21	2	2	0	6	6	0
Administrator B	22	1	3	-2	2	6	-4
Clerical A	36	13	5	8	31	32	-1
Clerical B	29	7	7	0	11	15	-4
Engineer A	83	20	14	6	15	12	3
Engineer B	57	17	11	6	12	7	5
Craft A	111	17	14	3	0	7	-7
Craft B	142	29	17	12	4	4	0
Laborer	69	19	16	3	5	3	2
Management A	99	13	16	-3	36	25	11
Management B	48	10	4	6	11	12	-1
Operator A	67	4	10	-6	1	9	-8
Operator B	63	11	1	10	3	1	2
Professional A	34	5	6	-1	22	14	8
Professional B	163	46	35	11	83	67	16
Para Professional	60	18	12	6	28	32	-4
Technical A	51	13	10	3	5	10	-5
Technical B	6	1	1	0	0	2	-2
<b>Total</b>	<b>1161</b>	<b>246</b>	<b>184</b>	<b>74/-12</b>	<b>275</b>	<b>264</b>	<b>47/-36</b>

**AACU Candidate Referrals for Underutilized Positions**

Job Group	Title	# of Vac	Requisition Int. / Ext.	Promotions/ Transfers	AACU Ref. External	Position Status
Craft B	HVAC Technician	1	Int	0	2	Promo = WM
Clerical B	Messenger/Courier	1	Int/Ext	0	2	NH = WF
Engineer B	Staff Engineer	1	Int/Ext	1	1	Trans = WM
Laborers	Buildings & Grounds Worker	3	Int/Ext	0	0	(3)NH = WM
Laborers	OMC Laborer	3	Int/Ext	1	1	Promo = WM
Management B	Asset Control Supervisor	1	Int	1	0	Promo = WM
Operator A	Research Vessel Operator	1	Int/Ext	0	0	NH = WM
Operator B	Operator	2	Int	1	0	Promo = BM & WM
Professional A	Lab Supervisor	1	Int	1	0	Promo = WM
Professional B	Chemist I	2	Int	1	0	Trans & Promo = WF
Professional B	Senior Laboratory Technician	3	Int/Ext	0	0	(2)NH = WF & Rehire = WM
Professional B	Chemist I	2	Int	2	0	Promo = BF & WF
Professional B	Chemist II	1	Int/Ext	0	0	Promo = WF
Professional B	Sr Financial Analyst	1	Int	1	0	Promo = WM
Professional B	Network Administrator III	1	Int/Ext	0	0	NH = HM
Professional B	Security Services Administrator	1	Int/Ext	0	0	NH = AF
Professional B	Systems Analyst Programmer II	1	Int/Ext	0	1	NH = WM
Professional B	Buyer	1	Int	1	0	Promo = BF
Technical A	Senior SCADA Technician	1	Int	1	0	Promo = WM
Technical A	Communication and Control	1	Int	1	0	Promo = WM

## MBE/WBE Expenditures

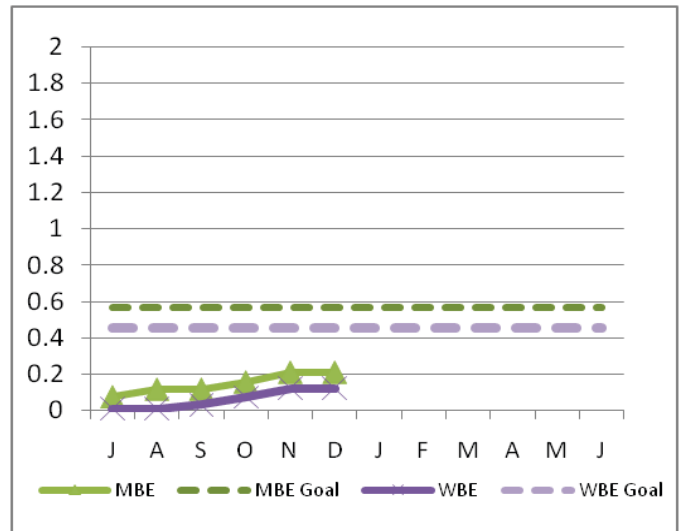
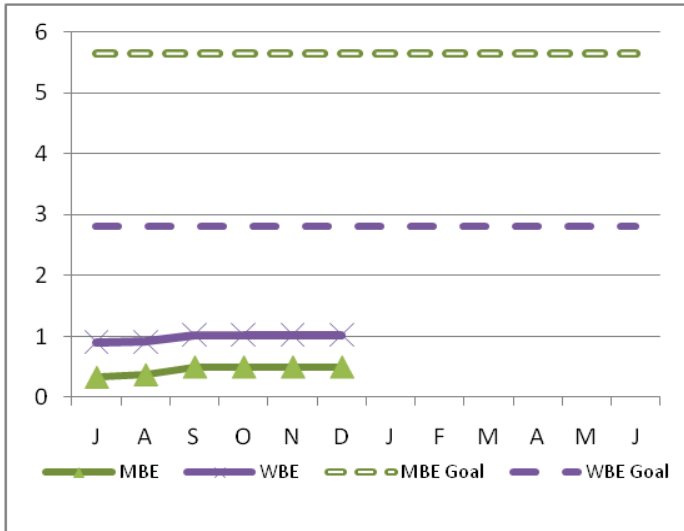
### 2nd Quarter - FY17

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.

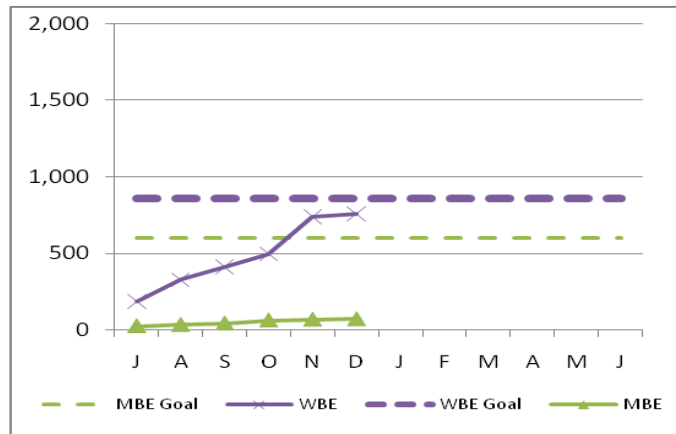
MBE/WBE percentages are the results from a 2002 Availability Analysis, and MassDEP's Availability Analysis. As a result of the Availability Analyses, the category of Non-Professional Services is included in Goods/Services. Consistent with contractor reporting requirements, MBE/WBE expenditure data is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

### Construction

### Professional Services



### Goods/Services



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

<b>MBE</b>			
FY17 YTD		FY16	
Amount	Percent	Amount	Percent
502,903	8.9%	1,805,604	37.9%
211,030	37.3%	828,841	55.3%
71,125	11.8%	255,324	40.6%
<b>785,058</b>	<b>11.5%</b>	<b>2,889,769</b>	<b>41.9%</b>

<b>WBE</b>			
FY17 YTD		FY16	
Amount	Percent	Amount	Percent
1,021,956	36.3%	1,114,916	47.1%
121,443	26.7%	314,752	26.1%
756,877	88.5%	1,124,374	160.7%
<b>1,900,276</b>	<b>46.1%</b>	<b>2,554,042</b>	<b>59.8%</b>

Construction  
Prof Svcs  
Goods/Svcs  
**Totals**

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

## FY17 CEB Expenses through 2<sup>nd</sup> Quarter – FY17

	December 2016 Year-to-Date					
	Period 6 YTD Budget	Period 6 YTD Actual	Period 6 YTD Variance	%	FY17 Approved	%
<b>EXPENSES</b>						
WAGES AND SALARIES	\$ 47,811,157	\$ 46,048,316	\$ (1,762,841)	-3.7%	\$ 101,588,897	45.3%
OVERTIME	2,081,423	2,183,804	102,381	4.9%	4,192,676	52.1%
FRINGE BENEFITS	10,004,307	9,689,604	(314,703)	-3.1%	20,242,323	47.9%
WORKERS' COMPENSATION	1,172,095	2,772,812	(399,283)	-34.1%	2,344,190	33.0%
CHEMICALS	4,790,837	5,096,351	305,514	6.4%	9,110,407	55.9%
ENERGY AND UTILITIES	10,081,280	9,603,644	(477,636)	-4.7%	21,541,077	44.6%
MAINTENANCE	14,795,053	15,508,221	713,168	4.8%	31,080,642	49.9%
TRAINING AND MEETINGS	214,812	173,218	(41,594)	-19.4%	435,481	39.8%
PROFESSIONAL SERVICES	3,145,892	3,088,463	(57,429)	-1.8%	6,531,939	47.3%
OTHER MATERIALS	1,901,902	2,179,799	277,897	14.6%	6,219,630	35.0%
OTHER SERVICES	11,652,788	10,985,916	(666,872)	-5.7%	22,974,855	47.8%
<b>TOTAL DIRECT EXPENSES</b>	<b>\$ 107,651,546</b>	<b>\$ 105,330,148</b>	<b>\$ (2,321,399)</b>	<b>-2.2%</b>	<b>\$ 226,262,117</b>	<b>46.6%</b>
<b>INDIRECT EXPENSES</b>						
INSURANCE	\$ 998,949	\$ 933,479	\$ (65,470)	-6.6%	\$ 1,997,898	46.7%
WATERSHED/PILOT	12,145,634	12,090,314	(55,320)	-0.5%	24,291,268	49.8%
BECO PAYMENT	386,930	391,314	4,384	1.1%	773,859	50.6%
MITIGATION	779,000	771,400	(7,600)	-1.0%	1,558,000	49.5%
ADDITIONS TO RESERVES	(83,871)	(83,871)	-	0.0%	(167,742)	50.0%
RETIREMENT FUND	4,632,624	4,632,624	-	0.0%	4,632,624	100.0%
POST EMPLOYEE BENEFITS	-	-	-	---	4,876,050	0.0%
<b>TOTAL INDIRECT EXPENSES</b>	<b>\$ 18,859,266</b>	<b>\$ 18,735,260</b>	<b>\$ (124,006)</b>	<b>-0.7%</b>	<b>\$ 37,961,957</b>	<b>49.4%</b>
<b>DEBT SERVICE</b>						
STATE REVOLVING FUND	\$ 40,168,407	\$ 39,760,853	\$ (407,554)	-1.0%	\$ 86,971,915	45.7%
SENIOR DEBT	131,424,056	130,896,551	(527,505)	-0.4%	268,472,556	48.8%
CORD FUND	-	-	-	---	-	---
DEBT SERVICE ASSISTANCE	-	-	-	---	(873,804)	---
CURRENT REVENUE/CAPITAL	6,100,000	6,100,000	-	0.0%	12,200,000	50.0%
SUBORDINATE MWRA DEBT	32,313,338	32,313,338	-	0.0%	69,997,992	46.2%
LOCAL WATER PIPELINE CP	2,074,621	2,074,621	-	0.0%	4,149,242	50.0%
CAPITAL LEASE	1,608,530	1,608,530	-	0.0%	3,217,060	50.0%
DEBT PREPAYMENT	-	-	-	---	10,994,960	0.0%
VARIABLE DEBT	-	(5,501,286)	(5,501,286)	---	-	0.0%
DEFEASANCE ACCOUNT	-	-	-	---	-	---
<b>TOTAL DEBT SERVICE</b>	<b>\$ 213,688,952</b>	<b>\$ 207,252,607</b>	<b>\$ (6,436,346)</b>	<b>-3.0%</b>	<b>\$ 455,129,921</b>	<b>45.5%</b>
<b>TOTAL EXPENSES</b>	<b>\$ 340,199,764</b>	<b>\$ 331,318,015</b>	<b>\$ (8,881,751)</b>	<b>-2.6%</b>	<b>\$ 719,353,995</b>	<b>46.1%</b>
<b>REVENUE &amp; INCOME</b>						
RATE REVENUE	\$ 347,439,250	\$ 347,439,250	\$ -	0.0%	\$ 694,878,500	50.0%
OTHER USER CHARGES	4,197,247	4,255,408	58,161	1.4%	8,752,834	48.6%
OTHER REVENUE	4,316,123	5,865,957	1,549,834	35.9%	6,519,171	90.0%
RATE STABILIZATION	-	-	-	---	-	---
INVESTMENT INCOME	4,508,943	4,239,123	(269,820)	-6.0%	9,473,490	44.7%
<b>TOTAL REVENUE &amp; INCOME</b>	<b>\$ 360,461,563</b>	<b>\$ 361,799,738</b>	<b>\$ 1,338,175</b>	<b>0.4%</b>	<b>\$ 719,623,995</b>	<b>50.3%</b>

As of December 2016, total expenses are \$331.3 million, \$8.9 million or 2.6% lower than budget and total revenue was \$361.8 million, \$1.3 million or 0.4% over budget, for a net variance of \$10.2 million.

### Expenses –

**Direct Expenses** are \$105.3 million, \$2.3 million or 2.2% below budget.

- **Wages & Salaries** are under budget by \$1.8 million or 3.7%. At the end of December, the average Full Time Equivalent (FTE) positions were 1,137, 13 positions fewer than the 1,150 budgeted FTE's.
- **Maintenance** is over budget by \$713k or 4.8%. Services are overspent by \$849k and Materials are underspent by \$135k. Over spending includes \$410k for Nut Island fire repairs and the remaining variance reflects timing of work budgeted in later months.
- **Other Services** are under budget by \$667k or 5.7% mainly due to lower Sludge Pelletization expense of \$264k reflecting lower year to date quantities, lower Space Lease/Rentals of \$195k 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, and \$128k for Grit and Screenings disposal services primarily due to lower quantities.
- **Utilities** are under budget by \$478k or 4.7% mainly due to electricity costs of \$268k, primarily for favorable pricing at DITP and lower diesel fuel cost of \$183k.
- **Workers' Compensation** is underspent by \$399k or 34.1% due to lower than budgeted Medical Payments of \$226k and Compensation Payments of \$193k, due mostly to reserve adjustments.
- **Chemicals** expenses were higher than budgeted by \$306k or 6.4% primarily for Activated Carbon of \$165,000 at DITP due to increased odor control via carbon as opposed to wet scrubbers; and Sodium Hypochlorite of \$76k.
- **Other Materials** are over budget by \$278k or 14.6% mainly due to timing of vehicle purchases of \$245k, Other Materials of \$58k, and Computer Hardware of \$59k, partially offset by lower Vehicle Expenses of \$135k reflecting lower than budgeted gasoline pricing and computer software expense \$56k.
- **Fringe Benefits** are under budget by \$315k or 3.1% mainly due to fewer than budgeted participants.

**Indirect Expenses** are \$18.7 million, \$124k under budget or 0.7%.

**Debt Service Expenses** totaled \$207.3 million, which was \$6.4 million or 3.0% under budget due mainly to lower than budgeted variable interest rates of \$5.5 million and savings from the August 2016 refunding.

### Revenue and Income –

**Total Revenue / Income** for December is \$361.8 million, \$1.3 million higher than budget as non-rate revenue including \$1.3 million for water sales related to the summer drought, \$299k for a favorable class action settlement related to derivatives, surplus equipment sales \$186k, and TRAC penalty \$115k, were partially offset by lower investment Income of \$270k due to unexpected calls and lower reinvestment rates.

## Cost of Debt 2<sup>nd</sup> 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.

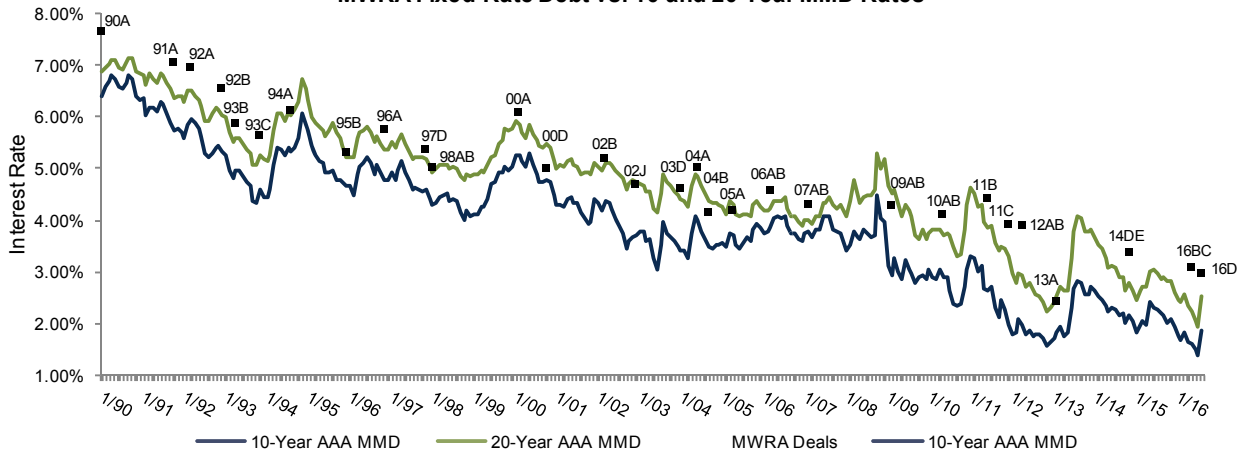
### Average Cost of MWRA Debt FYTD

Fixed Debt (\$3,621)	3.95%
Variable Debt (\$481.2)	1.00%
SRF Debt (\$980.1)	1.38%
 Weighted Average Debt Cost (\$5,083)	 3.17%

### Most Recent Senior Fixed Debt Issue August 2016

2016 Series D (\$104.3) 2.99%

### MWRA Fixed Rate Debt vs. 10 and 20 Year MMD Rates

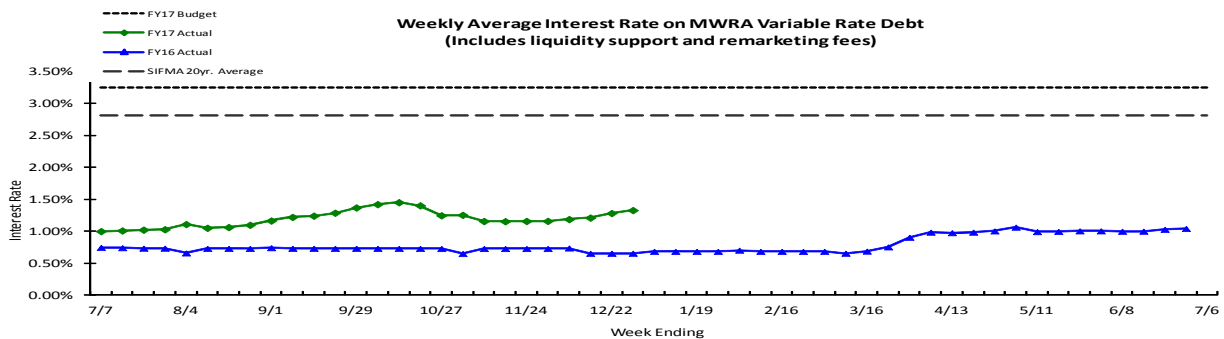


Bond Deal	1992A	1992B	1993B	1993C	1994A	1995B	1996A	1997D	1998AB	2000A	2000D	2002B	2002J	2003D
Rate	6.98%	6.58%	5.89%	5.66%	6.15%	5.34%	5.78%	5.40%	5.04%	6.11%	5.03%	5.23%	4.71%	4.64%
Avg Life	22.6 yrs	6.3 yrs	19.8 yrs	19.1 yrs	19.5 yrs	20.5 yrs	19.5 yrs	21.6 yrs	24.4 yrs	26.3 yrs	9.8 yrs	19.9 yrs	19.6 yrs	18.4 yrs

Bond Deal	2004A	2004B	2005A	2006AB	2007AB	2009AB	2010AB	2011B	2011C	2012AB	2013A	2014DEF	2016BC	2016D
Rate	5.05%	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%
Avg Life	19.6 yrs	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	18.8 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 December, SIFMA rates ranged from a high of 0.73% to a low of 0.56% 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.

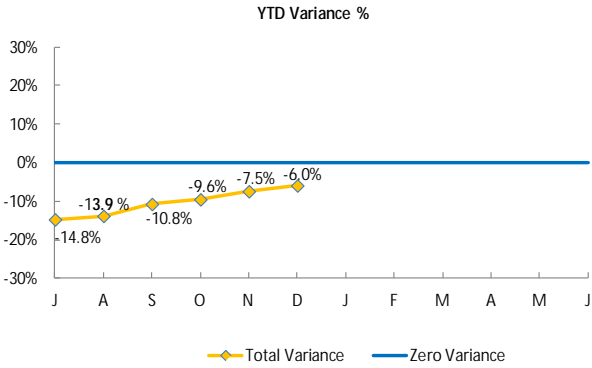




# Investment Income

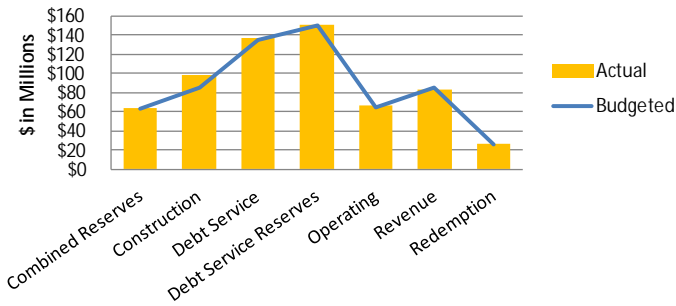
## 2<sup>nd</sup> Quarter – FY17

### Year To Date

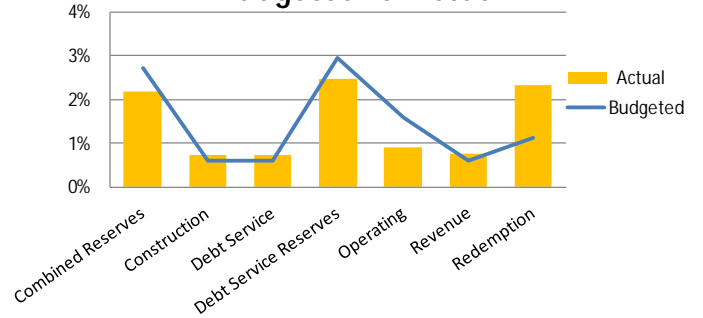


	YTD BUDGET VARIANCE			
	(\$'000)			
	BALANCES IMPACT	RATES IMPACT	TOTAL	%
<b>Combined Reserves</b>	(\$0)	(\$165)	(166)	-19.8%
<b>Construction</b>	\$38	\$63	101	40.6%
<b>Debt Service</b>	\$7	\$94	102	26.0%
<b>Debt Service Reserves</b>	\$14	(\$339)	(325)	-15.2%
<b>Operating</b>	\$20	(\$220)	(200)	-40.2%
<b>Revenue</b>	(\$5)	\$71	65	26.2%
<b>Redemption</b>	(\$0)	\$154	154	106.3%
<b>Total Variance</b>	<b>\$73</b>	<b>(\$343)</b>	<b>(\$270)</b>	<b>-6.0%</b>

### YTD Average Balances Budgeted vs. Actual

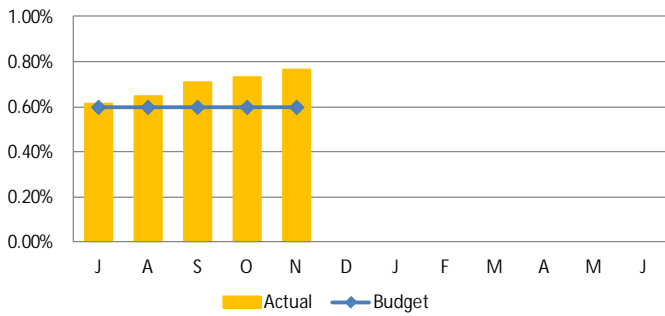


### YTD Average Interest Rate Budgeted vs. Actual

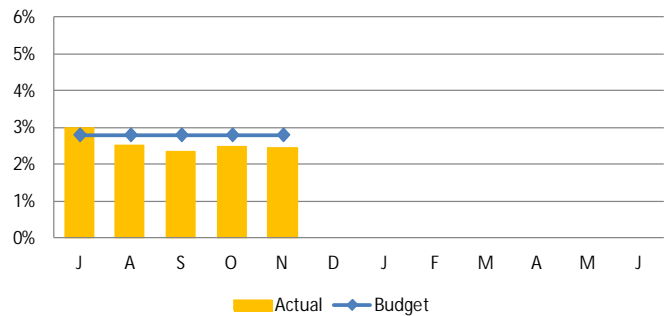


## Monthly

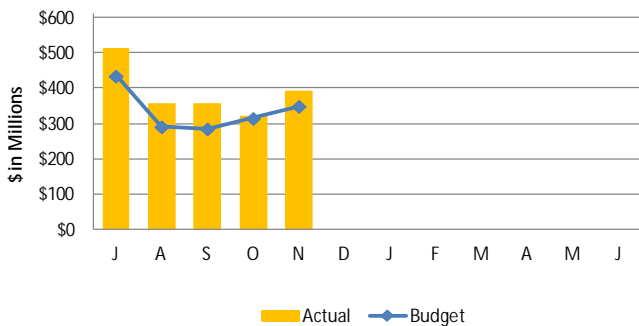
### Short - Term Interest Rates



### Long - Term Interest Rates



### Short-Term Average Balances



### Long-Term Average Balances

