

MASSACHUSETTS WATER RESOURCES AUTHORITY

**Board of Directors Report**  
On  
**Key Indicators of MWRA Performance**  
For  
Second Quarter FY2018

Q1	Q2	Q3	Q4



Frederick A. Laskey, Executive Director  
Michael J. Hornbrook, Chief Operating Officer  
February 21, 2018

# Board of Directors Report on Key Indicators of MWRA Performance

## 2nd Quarter FY18

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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.

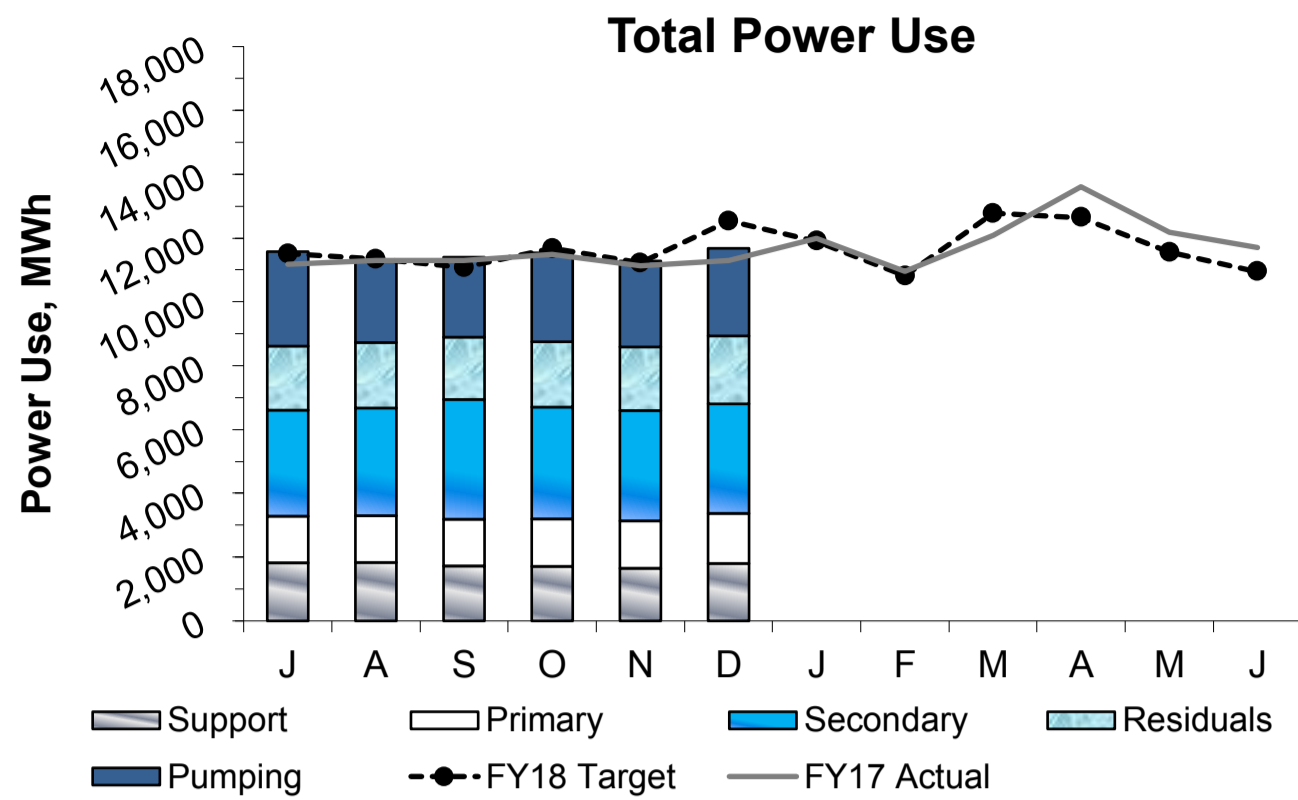
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# OPERATIONS AND MAINTENANCE

# Deer Island Operations

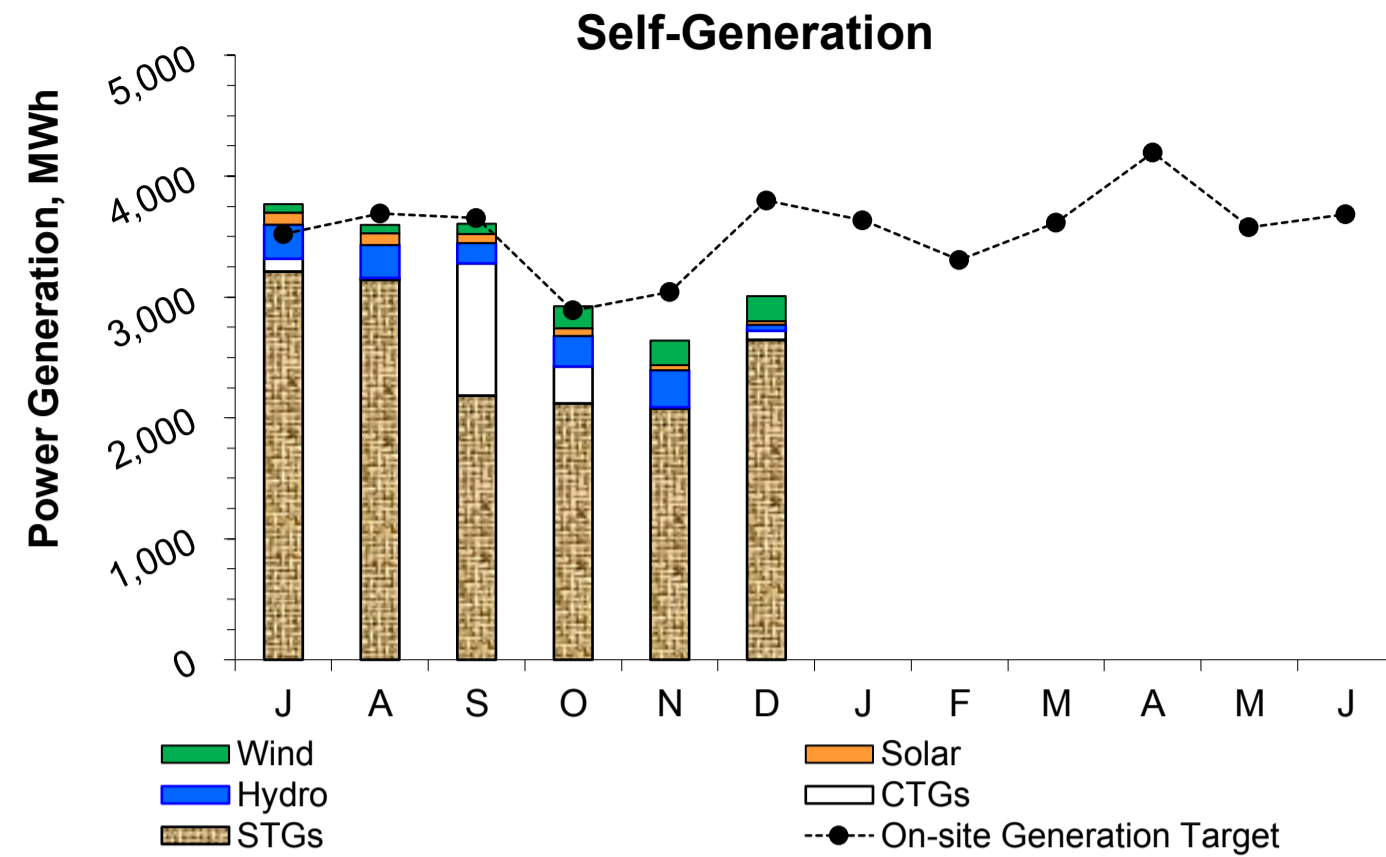
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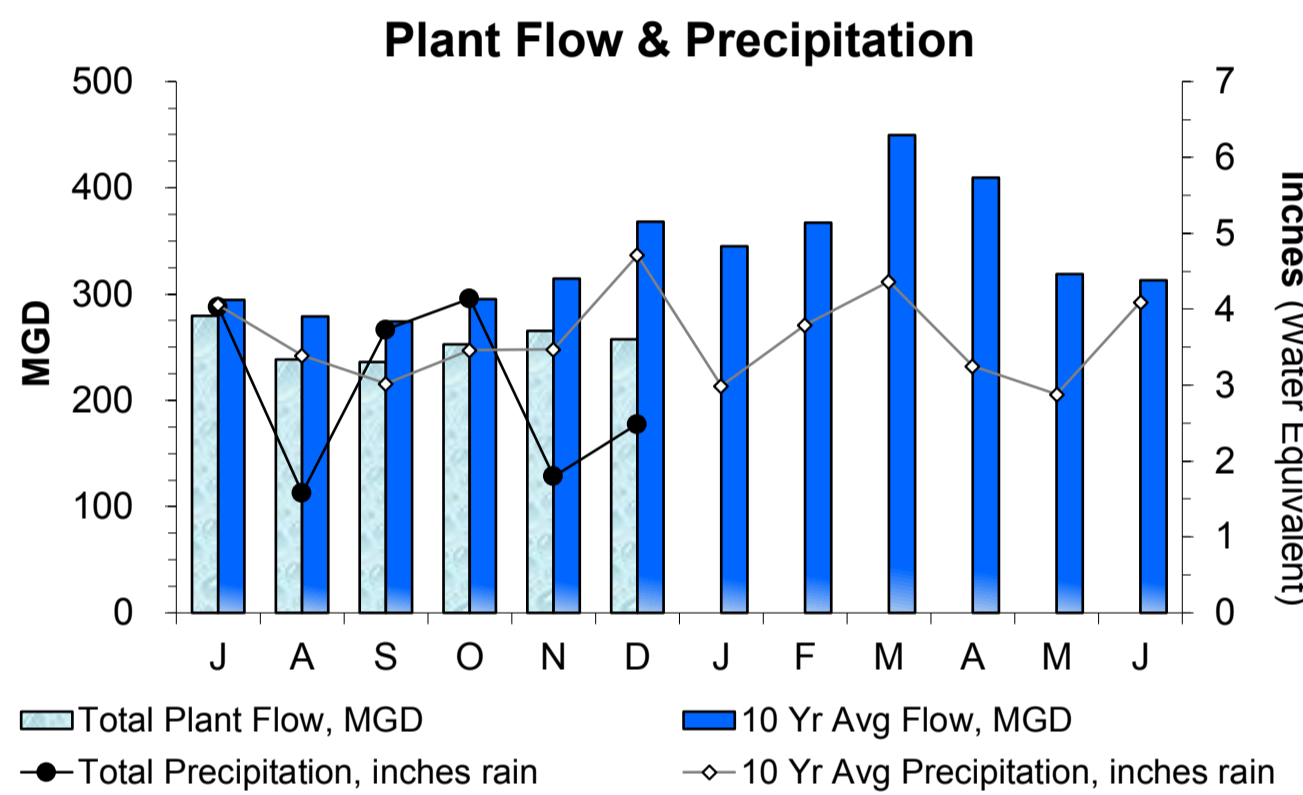


Total power usage in the 2nd Quarter was 2.6% below target as Total Plant Flow was 9.8% below target with the 3 year average plant flow. All processes were on or below target this quarter, except for Support and secondary treatment. More energy was needed in the secondary treatment process to maintain target levels of dissolved oxygen in the secondary reactors.

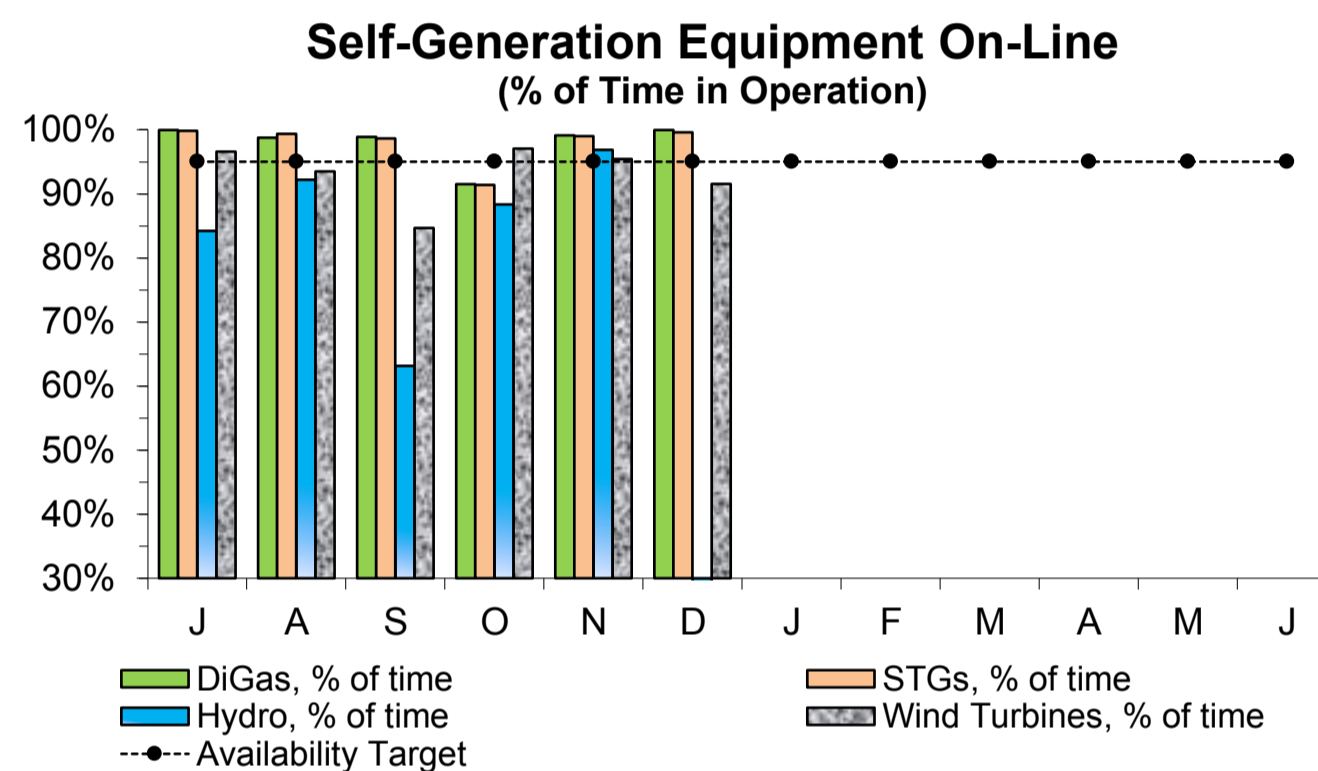
Note: Power usage projections are based on 3 year averages.



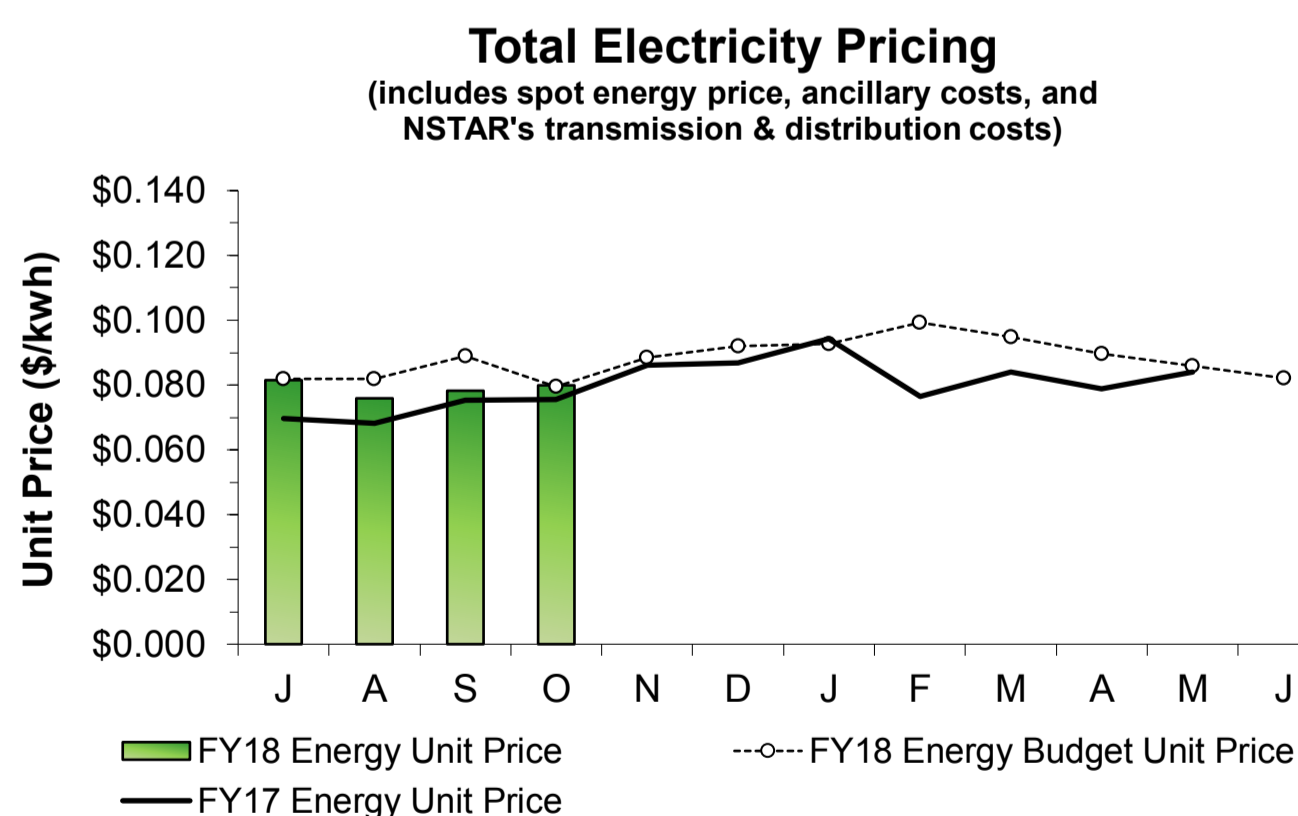
Power generated on-site during the 2nd Quarter was 11.8% below target. Generation by the STGs, Wind Turbines, and Solar Panels met or exceeded their targets. The CTGs were operated for two days in October during a heavy rain event, as well as briefly running during Eversource maintenance, a seasonal ISO-NE declared audit, and for maintenance and checkout purposes. However, the CTG generation was 50.3% below target, which includes CTG operation each month during storm events. Generation by the Hydro Turbines was 56.2% below target primarily due to Turbine #1 being out of service awaiting repair of its rotating assembly, and Turbine #2 was out of service with mechanical problems in December.



Total Plant Flow for the 2nd Quarter was 20.7% below target with the 10 year average plant flow (258.5 MGD actual vs. 326.0 MGD expected) as precipitation for the quarter was 27.6% lower than target (8.43 inches actual vs. 11.65 inches expected).

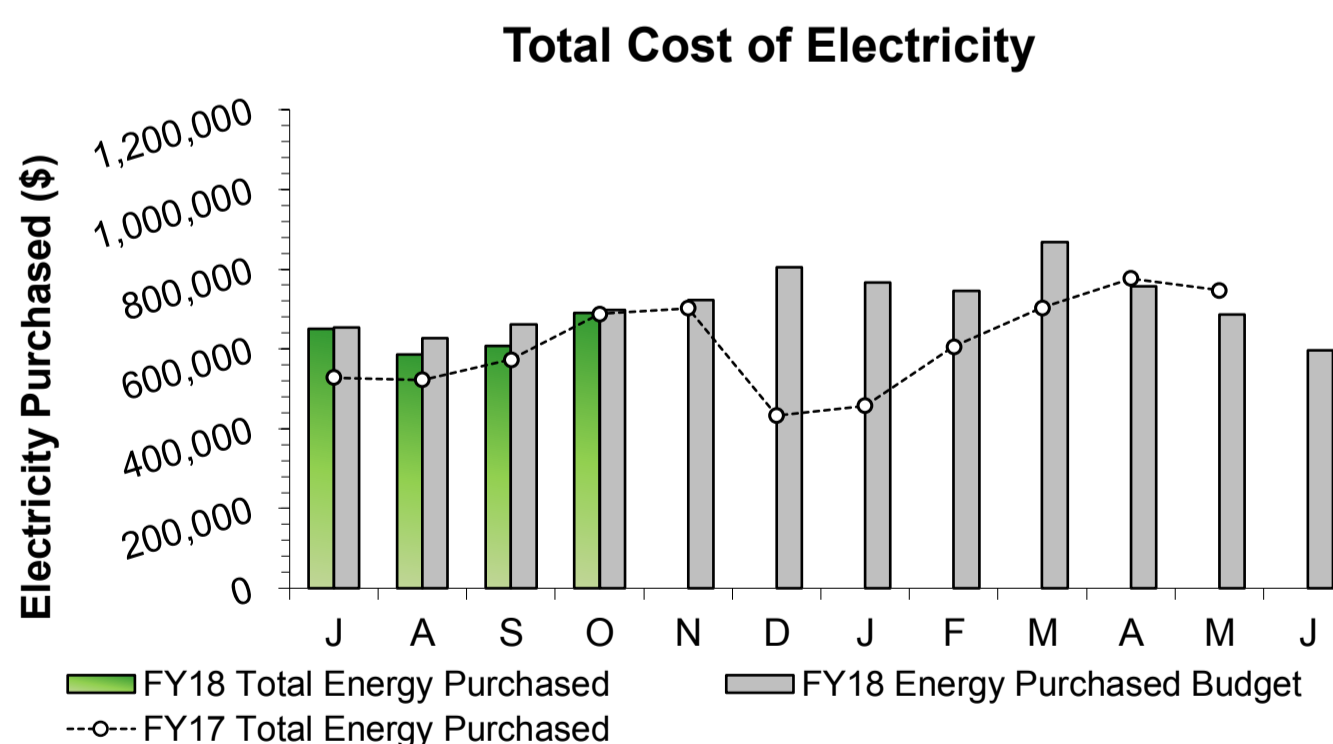


The DiGas system, STGs, and Wind Turbines met or exceeded the 95% availability target for the 2nd Quarter. The Hydro Turbines fell 33.6% below target primarily due to Turbine #1 being out of service awaiting repair of its rotating assembly.



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, through October (the most current invoice available) was on target (+0.5%) with budgetary estimates. The actual total energy unit price in November and December are not yet available as the complete invoices have not been received. 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) months due to the timing of invoice receipt and review.



The invoices for the total cost of Electricity Purchased for November and December have not been received as of reporting time. The total cost of Electricity Purchased during the 2nd Quarter (October data only) was 4.0% lower than budget as the Total Energy Unit Price is lower than budgeted by 5.0%, and the Total Electricity Purchased is on target (+0.8%) through October.

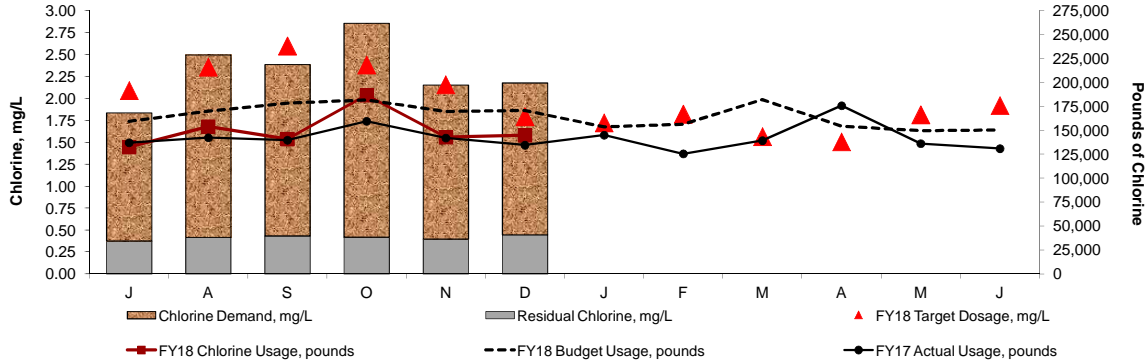
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# Deer Island Operations

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## Deer Island Sodium Hypochlorite Use Disinfection Dosage and Usage in Pounds



The disinfection dosing rate in the 2nd Quarter was 13.5% above the target. DITP maintained an average disinfection chlorine residual of 0.42 mg/L this quarter with an average dosing rate of 2.40 mg/L (as chlorine demand was 1.97 mg/L). Actual sodium hypochlorite usage in pounds of chlorine was 9.1% below target this quarter due to lower plant flow.

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	2	2	0	99.5%	7.51
A	0	0	0	100.0%	0.00
S	1	1	0	99.98%	1.36
O	1	1	0	98.4%	12.30
N	0	0	0	100.0%	0.00
D	0	0	0	100.0%	0.00
J					
F					
M					
A					
M					
J					
<b>Total</b>	<b>4</b>	<b>4</b>	<b>0</b>	<b>99.6%</b>	<b>21.18</b>

99.5% of all flows were treated at full secondary during the 2nd Quarter. There was a single secondary blending event due to high plant flow resulting from heavy rain. This blending event resulted in a total of 12.30 hours of blending and 123.46 Mgal of primary-only treated effluent with secondary effluent. The Maximum Secondary Capacity for the entire quarter was 700 MGD.

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

## Deer Island Operations & Maintenance Report

### Environmental/Pumping:

The plant achieved an instantaneous peak flow rate of 1,167.0 MGD in the early morning of October 29. This peak flow occurred during a two (2) day rain event that produced a total of 1.94 inches of precipitation. Overall, Total Plant Flow for Quarter 2 was 20.7% below target with the 10 year average plant flow target for the month.

Cleaning of the North Main Pump Station riser shafts occurred in October. The ten-foot diameter North Metropolitan Relief Tunnel riser shaft and the eleven-foot diameter Boston Main Drainage Tunnel riser shaft yielded a combined total of 13.65 tons of material for disposal under the grit and screenings hauling and disposal contract. The removal of this floating material reduces the risk of pumping system malfunctions during low flow and pump-down events at the North Main Pump Station. This cleaning occurs twice a year.

There were two (2) new monthly low flow records for the month of December (post DITP startup, July 1998) -

Total Plant Flow – 257.44 MGD set in December 2017 (previous December record was 274.87 MGD in 2001),  
North System Flow – 168.08 MGD set in December 2017 (previous December record was 186.41 MGD in 2015)

The December 2017 South System Flow of 89.35 MGD did not break the December low monthly flow record of 80.88 MGD set in 2001 but came in second place.

# Deer Island Operations

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## Deer Island Operations & Maintenance Report (continued)

### 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 Cryogenic Oxygen 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. The same turnaround maintenance was completed on Train #2 in the spring (April 2017).

### Odor Control:

The North Pumping Odor Control (NPOC) Facility, which is responsible for treating the process airflows from the North Main Pump Station and the Winthrop Terminal Headworks Facility, was taken offline on November 2 for a total shutdown of 5 hours and 53 minutes to allow staff to perform essential work to replace the motor on airflow Fan #1.

The odor control fans in the Secondary Odor Control (SOC) Facility were taken offline on November 3 for a total shutdown of 6 hours and 31 minutes. The shutdown was required to conduct scheduled corrective maintenance/cleaning on the airflow dryers (duct heating coils) to remediate airflow restriction that occurs over time.

The Primary Battery C and D airflow in the West Odor Control (WOC) Facility was offline for 5 hours on November 18 as a result of a leak in the scrubber chemical recirculation line. Process airflow was restored later in the afternoon.

Process air was contained within the buildings during each of these odor control shutdowns and there were no odor complaints associated with these airflow shutdowns.

### Residuals:

The sludge feed to Module #2 Digester #4 was temporarily suspended for approximately 14 days and the digester emptied of sludge to allow for scheduled maintenance to replace the mixer. Module #2 Digester #4 was returned to operation on November 15 and filled with digested sludge overflows from the other operating digesters until November 19 when the normal sludge feed to the digester was resumed.

### Energy and Thermal Power Plant:

Overall, total power generated on-site accounted for 24.8% of Deer Island's total power use for the quarter. Renewable power generated on-site (by Solar, Wind, STGs, and Hydro Turbines) accounted for 23.7% of Deer Island's total electrical power use for the quarter.

The annual maintenance at the Thermal Power Plant took place starting on September 24 and continued into October 4. 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. Boiler 101 and the BP-STG were returned to operation during the very early morning of October 4 followed by the operation of the main STG later in the evening.

On December 14, ISO-New England declared a seasonal audit to verify the availability of the Combustion Turbine Generator (CTG) to provide power and remove Deer Island from the electrical grid. CTG-1A was brought online, successfully removing DITP from the grid, in compliance with the audit.

The CTGs were operated for over four (4) hours to support Eversource maintenance activities at their electrical Station 132 on December 7.

The emissions compliance Annual Relative Accuracy Test Audit (RATA) was successfully completed by contractors on December 13 for Boiler 201 and on December 14 for Boiler 101. A RATA or Relative Accuracy Test Audit is required to confirm that data from the boiler's Continuous Emissions Monitor (CEM) system is in agreement with corresponding EPA Reference Method test results. Quarterly emissions opacity audits for both boilers were successfully completed on December 15.

DITP took delivery of 343,000 gallons of #2 fuel oil without incident from December 5 through December 12. This fuel oil is used for CTG operation, for boiler startup operations, and for supplemental fuel for boiler operation during periods of low or unstable digester gas production.

### Regulatory:

Based on the treatment plant's performance in 2017, 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 Platinum11 Award for having operated with no permit violations from 2007 through 2017. 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 2017, Clinton Treatment Plant is expected to receive NACWA's (National Association of Clean Water Agencies) Silver Award for Peak Performance which recognizes member agency facilities for compliance of their National Pollutant Discharge Elimination System (NPDES) permit limits. The Silver Award is given to facilities with with no more than five NPDES permit violations for the entire calendar year. The chronic toxicity test result was below the permit limit in March 2017.

Phosphorus Reduction Facility: Work completed or in progress during the second quarter: Contractor completed performing wet check out of disk filters and instrumentation & controls and commenced operation of the disk filter system automatically through the PLC. The monorail system installation was completed. HVAC contractors installed a new exhaust fan. Installation of the new plant water system was completed. System check out, start up, and O&M training was completed by the vendor.

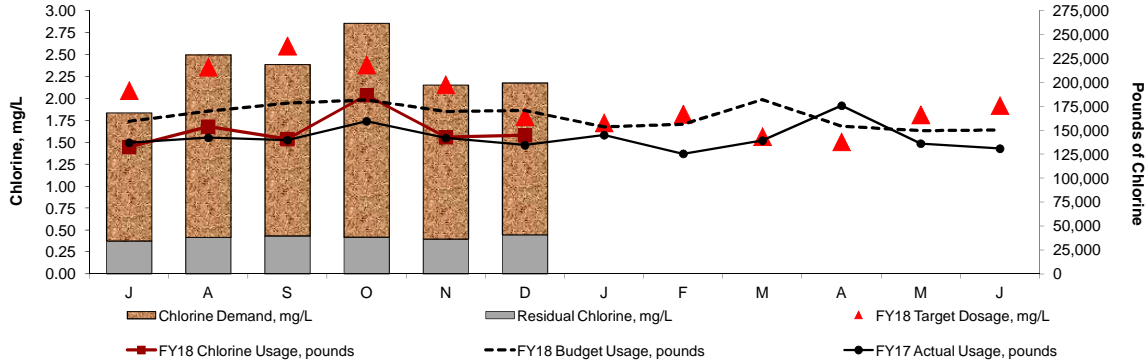
In the Headworks Building, the burner boiler was removed, a new one installed, and the exhaust vent chimney was replaced. Removal of the old oil tank was completed.

# Deer Island Operations

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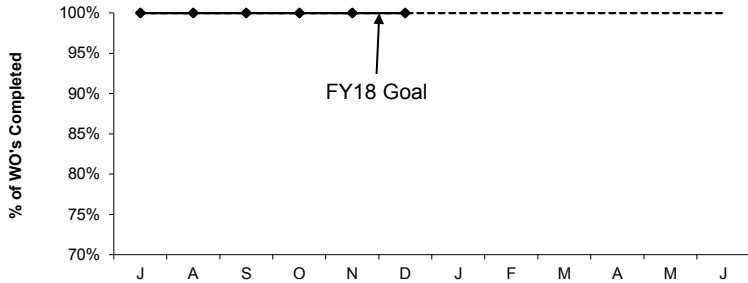
# Deer Island Maintenance

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## Productivity Initiatives

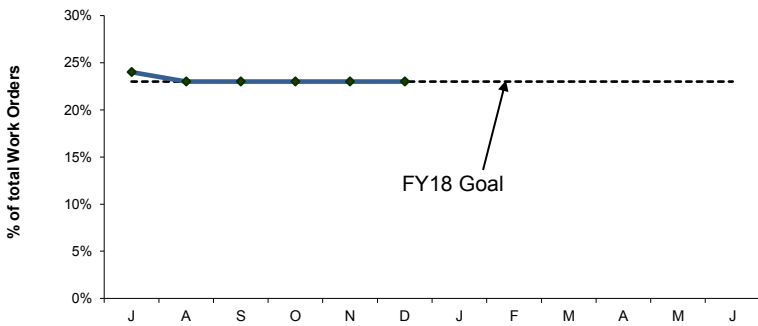
Productivity initiatives include increasing predictive maintenance compliance and increasing PdM work orders. Accomplishing these initiatives should result in a decrease in overall maintenance backlog.

### Predictive Maintenance Compliance



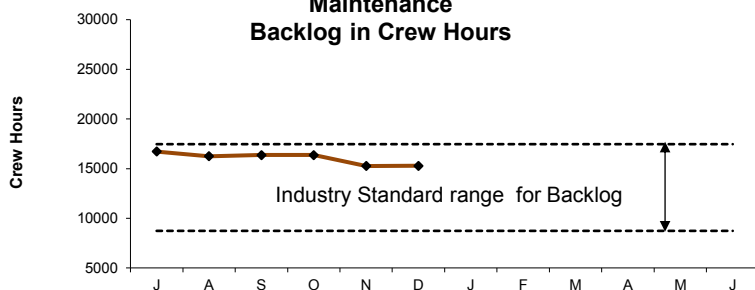
Deer Island's FY18 predictive maintenance goal is 100%. DITP completed 100% of all PdM work orders this quarter. DITP is continuing with an aggressive predictive maintenance program.

### Predictive Maintenance



Deer Island's FY18 predictive maintenance goal is 23% of all work orders to be predictive. 23% 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 15,633 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 two vacancies; one M&O Specialist and a Pipe/Plumber. Management continues to monitor backlog and to ensure all critical systems and equipment are available.

## Proactive Initiatives

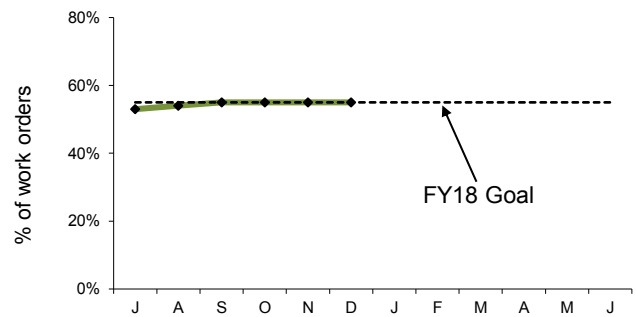
Proactive initiatives include completing 100% of all preventative maintenance tasks and increasing preventative maintenance kitting. These tasks should result in lower maintenance costs.

### Preventive Maintenance Compliance



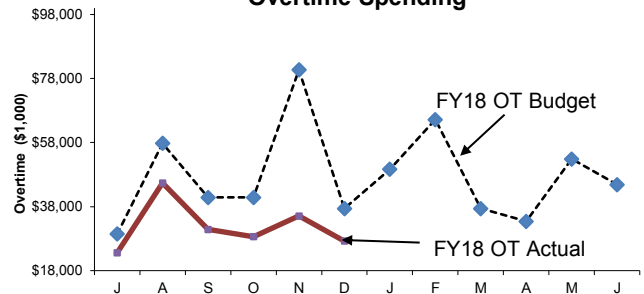
Deer Island's FY18 preventative maintenance goal is 100% completion of all work orders from Operations and Maintenance. DITP completed 100% of all PM work orders this quarter.

### Maintenance Kitting



Deer Island's FY18 maintenance kitting goal is 55% of all work orders to be kitted. 55% 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 under budget by \$64K this quarter and \$111k 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 Storm Coverage/High Flows, Clinton Treatment Electrical Upgrade Project, Installing Secondary Aeration Mixer #1A, MOD 2 Digester 4 Mixer Replacement and Residuals Rotary Screen #2 Rebuild.

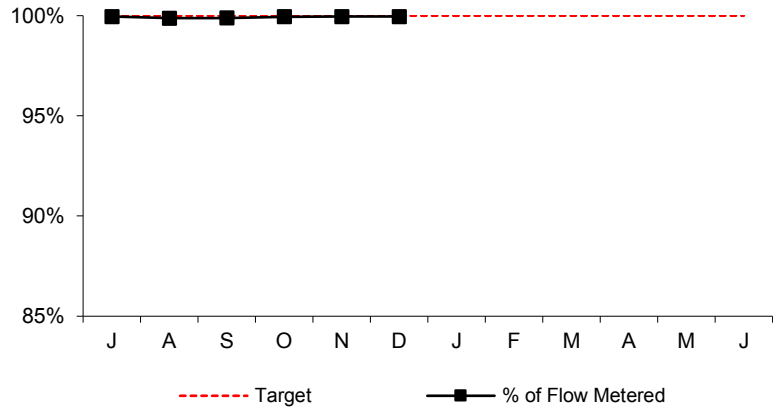


# Operations Division Metering & Reliability

2nd Quarter - FY18

## WATER METERS

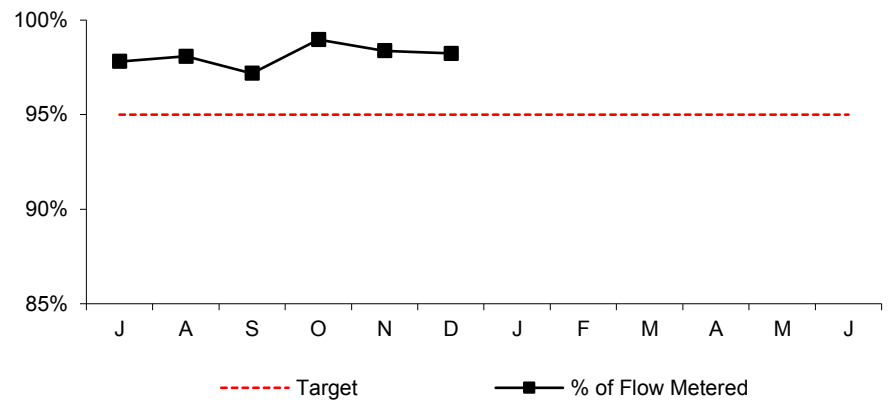
**Percent of Total Revenue Water Deliveries Calculated Using Meters**



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, 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

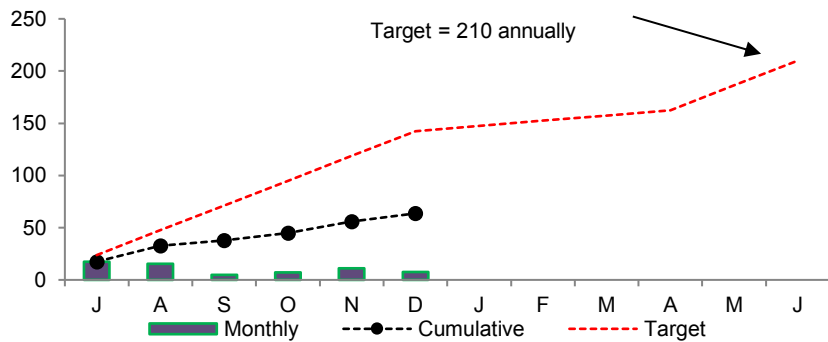
**Percent of Total Wastewater Transport Calculated Using Meters**



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, meter actuals accounted for 98.53% of flow; only 1.47% of wastewater transport was estimated.

## WATER DISTRIBUTION SYSTEM PIPELINES

**Miles Surveyed for Leaks**



During the 2nd Quarter 25.94 miles of water mains were inspected. The total inspected for the fiscal year to date is 63.67 miles.

**Leak Backlog Summary**

Month	J	A	S	O	N	D	J	F	M	A	M	J
Leaks Detected	4	2	4	6	5	2						
Leaks Repaired	2	1	3	7	2	3						
Backlog	8	9	10	9	12	11						

During the 2nd Quarter thirteen new leaks were detected. Twelve leaks were repaired in the 2nd Quarter; refer to FY18 Leak Report below for details. Also, community service ranging from individual leak location to hydrant surveys were conducted for: Arlington, Chelsea, Lynn, Medford, Milton, Revere, Somerville, Stoneham, Wakefield, Wellesley, Weston and Winchester.

### FY18 Leak Report as of 2nd Quarter

Date Detected	Location of Leaks	Repaired
07/13/17	General Edwards Bridge, Medford	07/26/17
07/28/17	W. Roxbury Parkway, West Roxbury	07/28/17
08/28/17	#425 Riverside Ave., Medford. SEC-57	08/28/17
07/27/17	#1 Woodland Road @ Pond Street, Stoneham	09/01/17
09/15/17	Columbus St., @ Fenno Street, Chelsea	09/18/17
09/28/17	#436 Riverside Ave., Medford. Section-57	09/28/17
08/13/17	River Road @ Loring Rd, Weston. WASM-4	10/20/17
09/24/17	#215 Common Street, Watertown	10/02/17
09/26/17	#1 Bellevue Street, Waltham	10/10/17
10/16/17	Lynnway (SouthBound) @ Sheppard St.	10/27/17
10/18/17	Hyde Park Ave. @ Hyde Park Pump Station	10/18/17
10/22/17	Vose Ave., Hyde Park	10/22/17
10/23/17	Riverside Ave. @Hall Street - Medford	10/23/17
10/19/17	1062 Hyde Park Ave., Hyde Park, Boston	11/13/17
10/31/17	Revere Beach Pkwy @ Suffolk Downs	11/08/17
11/20/17	Off Ramp 128 Mass Pike-Weston.	12/18/17
11/27/17	#93 Worcester St. Sec-80, Wellesley.	12/13/17
12/29/17	Chelsea Creek Headworks. Chelsea	12/29/17

Date Detected	Location of Leaks/Unrepaired
06/08/15	Allandale Rd. @ Grove St., Brookline, Sect 78, located acoustically. Not surfacing.
06/17/15	Washington St at East St., Dedham; Sect 77, located acoustically, not surfacing, need redundant SEH pipeline to enable isolation.
07/01/16	241 Forest St. Winchester, Sect 89, leaking blow of valve, not surfacing. Need redundant NIH pipeline to enable isolation.
07/26/16	Reservoir Playground, Cleveland Circle, in softball outfield, Fisher Hill main leaking into drain, not surfacing, need to repair in Winter.
12/04/16	1025 W Roxbury Pkwy, Brookline, Sect 95, located acoustically, not surfacing, leaking blow off valve.
12/04/16	710 Ashland St/Summer St. Lynn, Sect 91, not surfacing. Leaking emergency connection valve between MWRA and LWSC systems. LWSC has difficulty isolating 16" main.
07/20/17	Mystic Valley Parkway, Medford. Not surfacing.
11/02/17	Frontage Rd. @ Veneer St., Arlington. Leaking blowoff valve; not surfacing
11/20/17	Peabody St. @ Washington St., Newton. Air valve leak, not surfacing.
11/26/17	Nonantum Rd. @ Maple St., Newton. Air valve leak, not surfacing.
12/12/17	# 352 Norfolk St. Cambridge. Repair underway. Expect to complete in January.

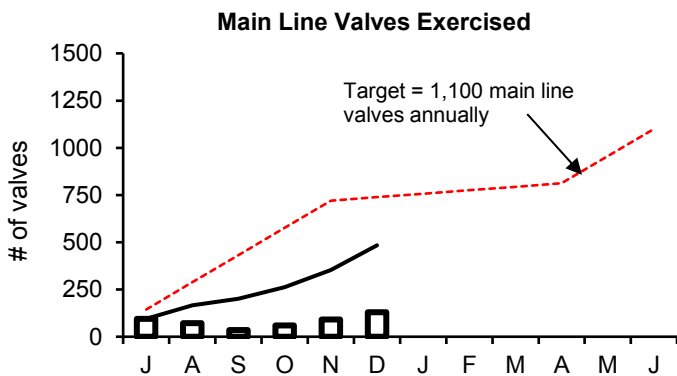
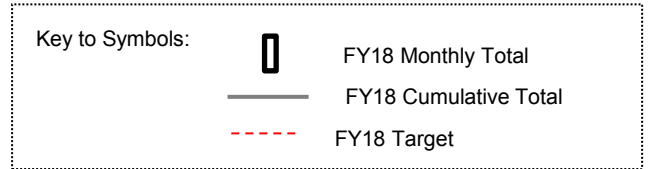
# Water Distribution System Valves

2nd Quarter - FY18

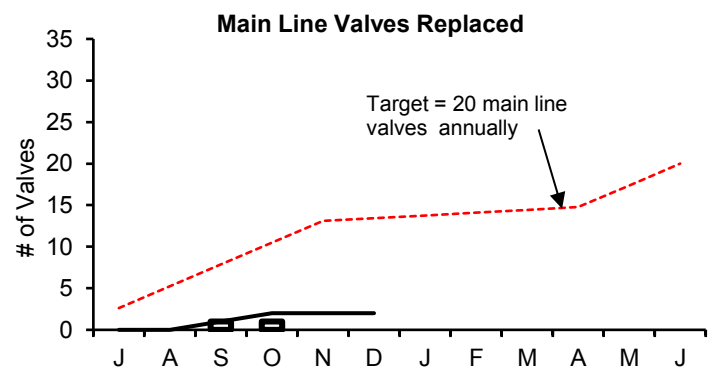
## Background

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.

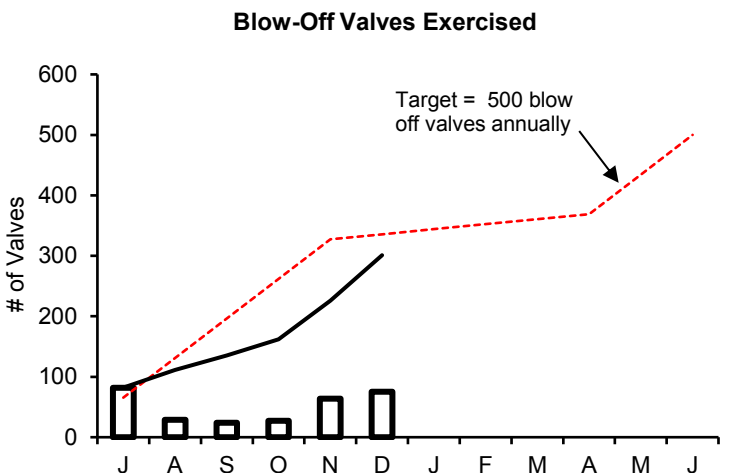
Type of Valve	Inventory #	Operable Percentage	
		FY18 to Date	FY18 Targets
Main Line Valves	2,159	96.5%	95%
Blow-Off Valves	1,317	97.7%	95%
Air Release Valves	1,380	94.7%	95%
Control Valves	49	100.0%	95%



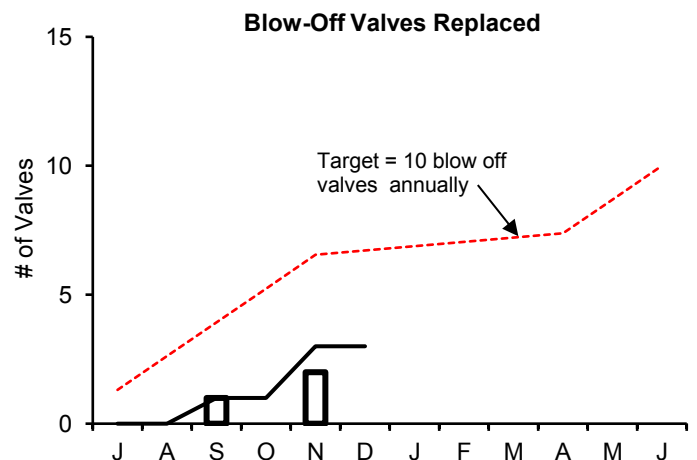
During the 2nd Quarter of FY18, staff exercised 282 main line valves. The total exercised for the fiscal year is 484.



During the 2nd Quarter of FY18, staff replaced one main line valve. The total replaced for the fiscal year is two. Below target due to other projects such as Watertown Pipeline coupling and leak repairs taking priority.



During the 2nd Quarter, staff exercised 166 blow off valves. The total exercised for the fiscal year is 301.



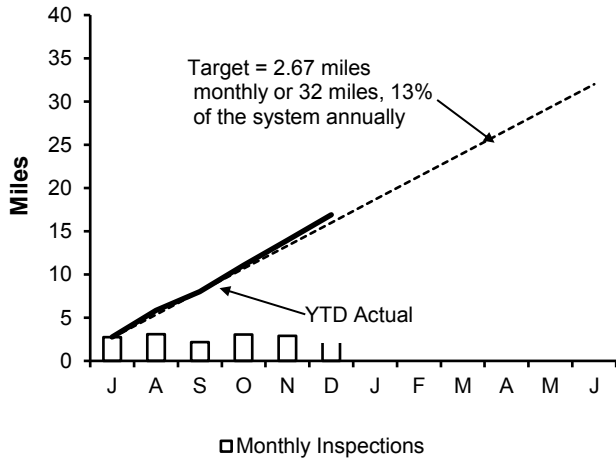
During the 2nd Quarter of FY18, staff replaced two blow off valves. The total replaced for the fiscal year is three. Below target due to other projects such as Watertown Pipeline coupling and leak repairs taking priority.

# Wastewater Pipeline, Structure Inspections and Maintenance

2nd Quarter - FY18

## Inspections

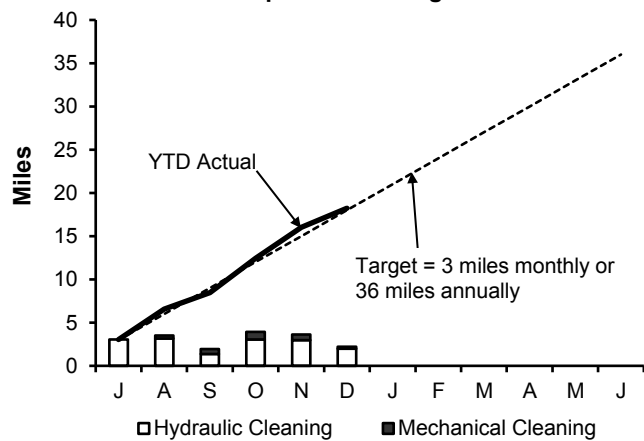
### Pipeline Inspections



Staff internally inspected 8.88 miles of MWRA sewer pipeline during the second quarter. No Community Assistance was provided this quarter.

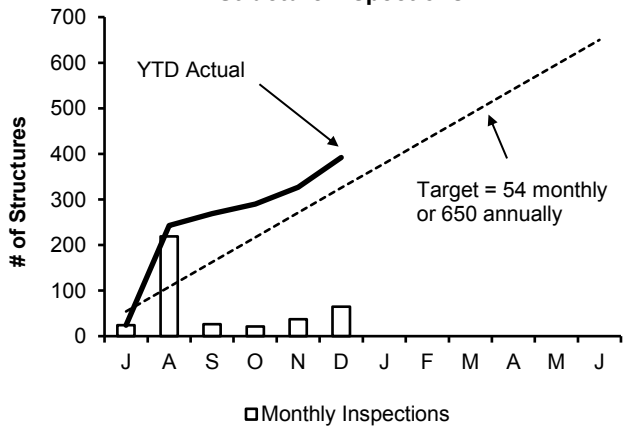
## Maintenance

### Pipeline Cleaning



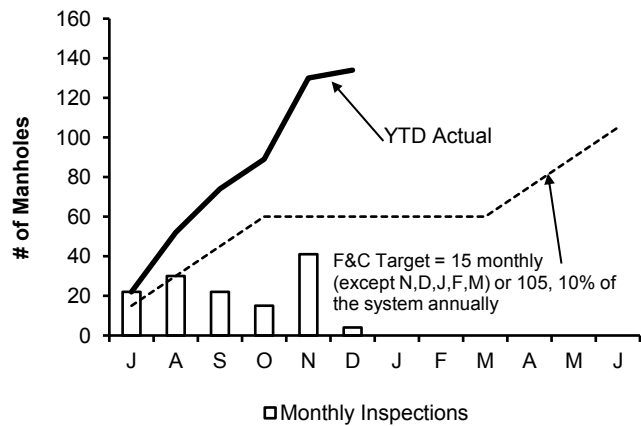
Staff cleaned 9.75 miles of MWRA's sewer system and removed 24 yards of grit and debris during the second quarter. Community Assistance was provided this quarter.

## Structure Inspections



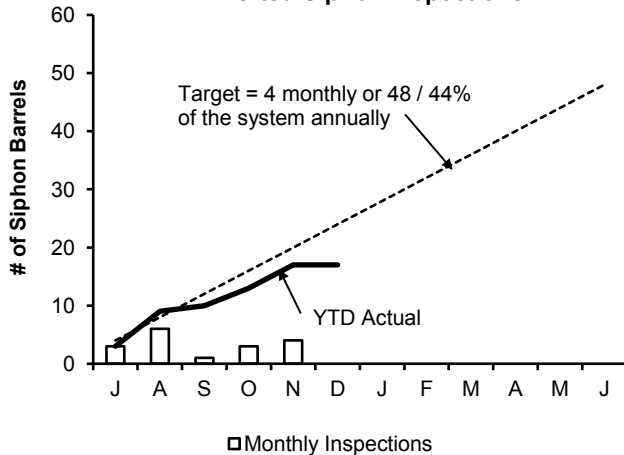
Staff inspected the 36 CSO structures and performed 87 additional manhole/structure inspections during the second quarter.

## Manhole Rehabilitation



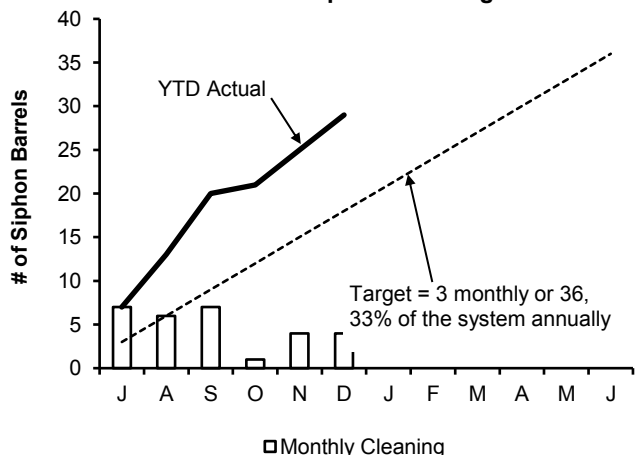
Staff replaced 60 frames & cover during the second quarter.

## Inverted Siphon Inspections



Staff inspected 7 siphon barrels this quarter.

## Inverted Siphon Cleaning

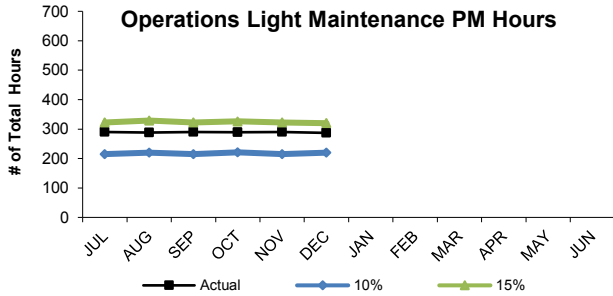


Staff cleaned 9 siphon barrel during the second quarter.

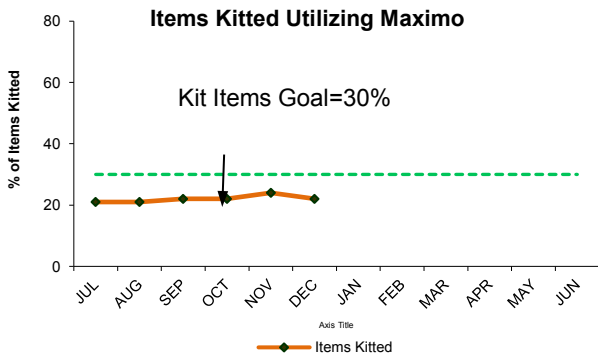
# Field Operations' Metropolitan Equipment & Facility Maintenance

2nd Quarter - FY18

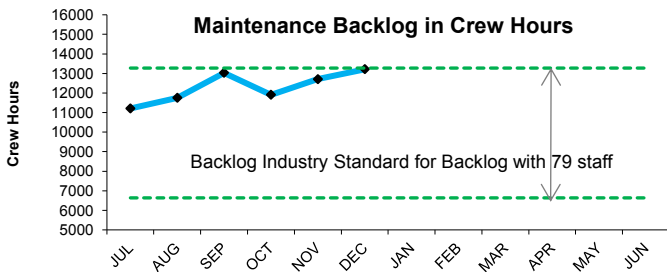
Several maintenance and productivity initiatives are in progress. The goal for the Overall PM completion and the Operator PM completion was raised to 100% for Fiscal Year 2010. The Operator PM and kitting initiatives frees up maintenance staff to perform corrective maintenance and project work, thus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



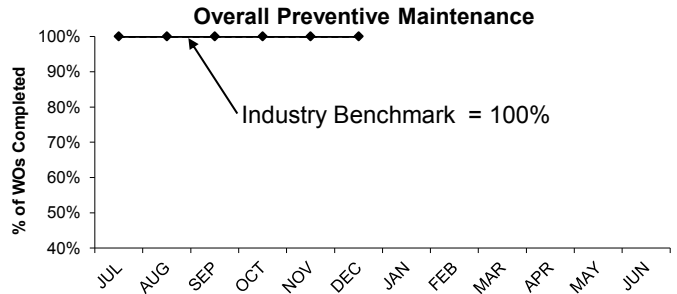
Operations staff averaged 289 hours of preventive maintenance during the 2nd Quarter, an average of 13% of the total PM hours for the 2nd Quarter, which is within the industry benchmark of 10% to 15%.



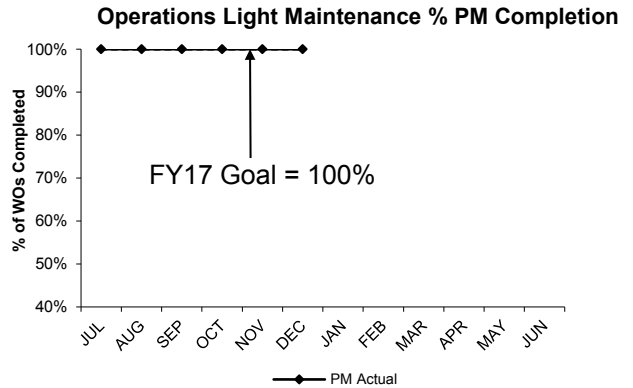
Operation's FY18 maintenance kitting goal has been set at 30% of all work orders to be kitted. Kitting is the staging of parts or material necessary to complete maintenance work. In the 2nd Quarter, 23% of all applicable work orders were kitted. This resulted in more wrench time and increased productivity.



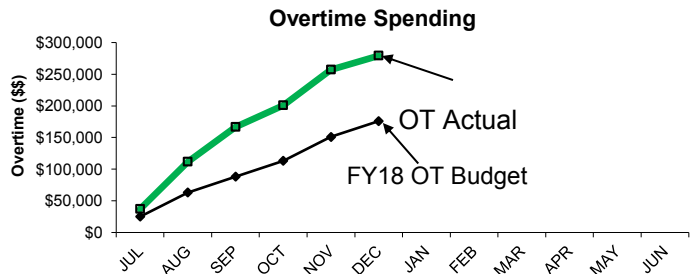
The 2nd Quarter backlog average is 12607 hours. Management's goal is to continue to control overtime and still stay within the industry benchmark of 6450 to 12,940 hours.



The Field Operations Department (FOD) preventive maintenance goal for FY18 is 100% of all PM work orders. Staff completed an average of 100% of all PM work orders in the 2nd Quarter.



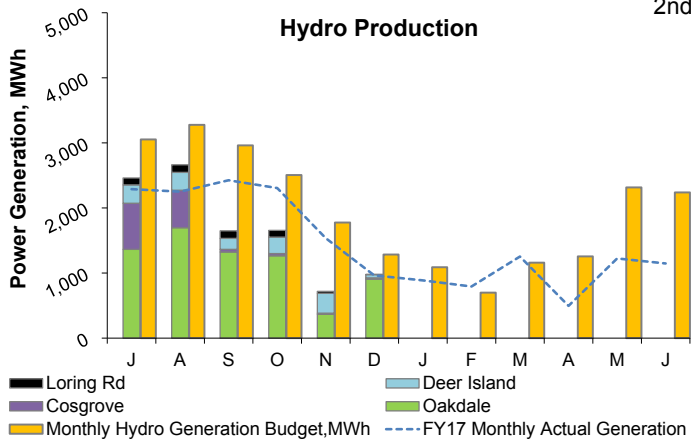
Wastewater Operators complete light maintenance PM's which frees up maintenance staff to perform corrective maintenance. Operations' FY18 PM goal is completion of 100% of all PM work orders assigned. Operations completed an average of 100% of PM work orders in the 2nd Quarter.



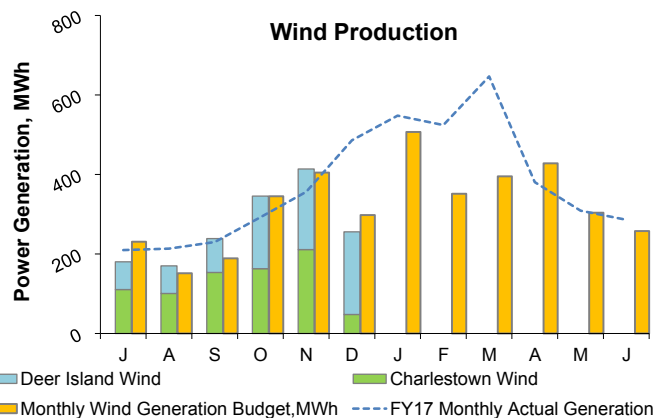
Maintenance overtime was \$24k over budget for the 2nd Quarter. Overtime was used for critical maintenance repairs. Year to date overtime for FY18 is \$279k, which is 103k over budget for the fiscal year.

# Renewable Electricity Generation: Savings and Revenue

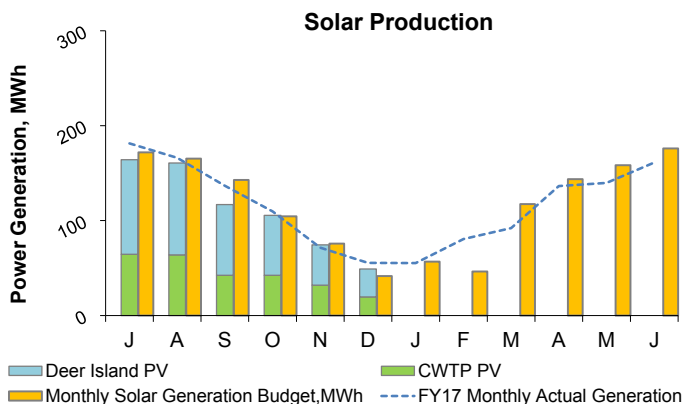
2nd Quarter - FY18



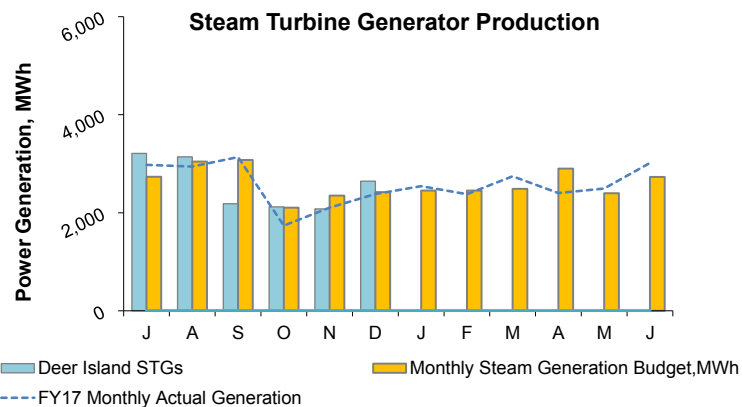
In the second Quarter, the renewable energy produced from all hydro turbines totaled 3,351 MWh; 40% below budget<sup>3</sup>. The total energy produced to date in FY18 is 10,123 MWh; 32% below budget<sup>3</sup>. This is mostly due to the Cosgrove generation values being highly underestimated by the utility company. The utility data for Cosgrove is typically corrected and reconciled in later months of the year. The total savings and revenue<sup>2</sup> to date in FY18 (actuals through October<sup>1</sup>) is \$285,693; 47% below budget<sup>3</sup>, due to the underestimated Cosgrove generation values from the utility (stated above). The savings and revenue value does not include RPS REC revenue (see next page).



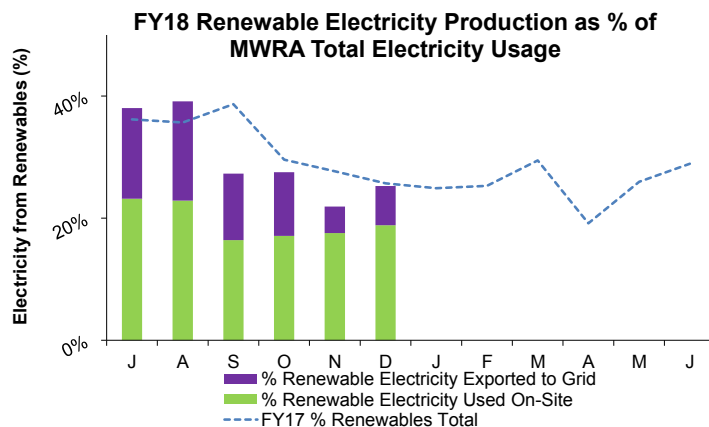
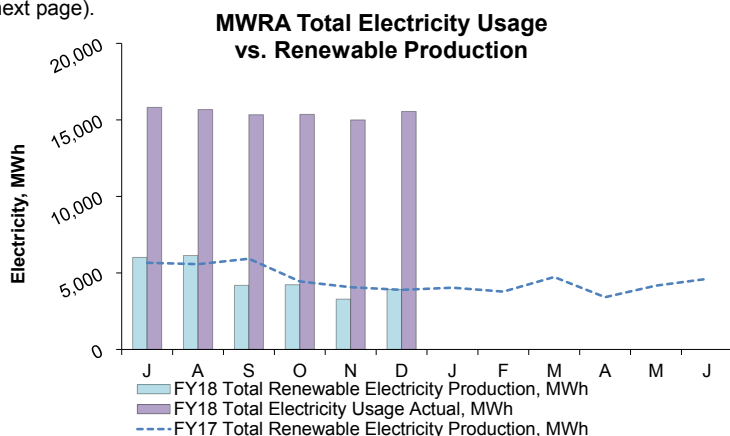
In the second Quarter, the renewable energy produced from all wind turbines totaled 1,015 MWh; 3% below budget<sup>3</sup>. The total energy produced to date in FY18 is 1,605 MWh; 1% below budget<sup>3</sup>. The total savings and revenue<sup>2</sup> to date in FY18 (actuals through October<sup>1</sup>) is \$144,475 ; 11% above budget<sup>3</sup>. The savings and revenue value does not include RPS REC revenue (see next page).



In the second Quarter, the renewable energy produced from all solar PV systems totaled 229 MWh; 3% above budget<sup>3</sup>. The total energy produced to date in FY18 is 671 MWh; 4% below budget<sup>3</sup>. The total savings and revenue<sup>2</sup> to date in FY18 (actuals through October<sup>1</sup>) is \$64,216; 8% below budget<sup>3</sup>. The savings and revenue value does not include RPS REC revenue (see next page).



In the second Quarter, the renewable energy produced from all steam turbine generators totaled 6,841 MWh; equal to budget<sup>3</sup>. The total energy produced to date in FY18 is 15,375 MWh; 2% below budget<sup>3</sup>. The total savings and revenue<sup>2</sup> to date in FY18 (actuals through October<sup>1</sup>) is \$840,072; 8% below budget<sup>3</sup>. The savings and revenue value does not include RPS REC revenue (see next page).

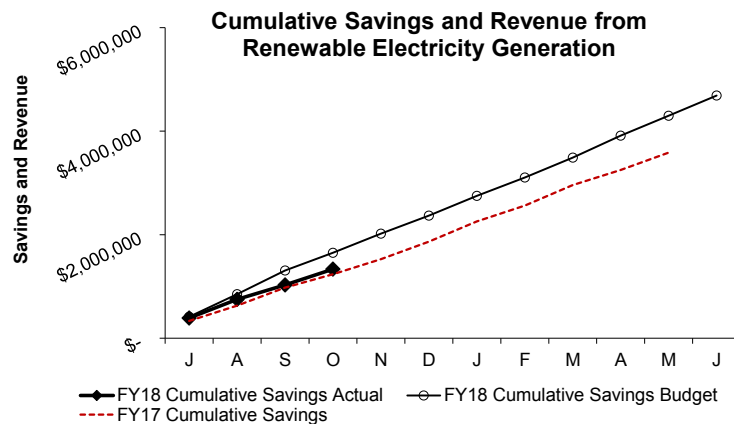
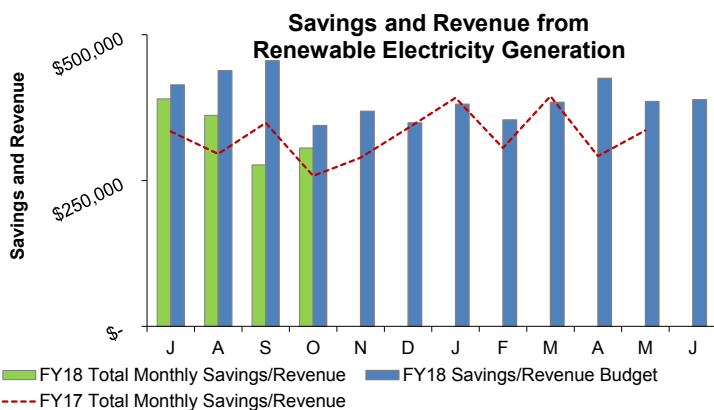


In the first half of FY18, MWRA's electricity generation by renewable resources totaled 27,773 MWh. Cosgrove hydro generation data was underestimated by the utility and will be reconciled in later months; this will be reflected in future reporting. MWRA's total electricity usage was approximately 92,739 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 FY18, green power generation represented approximately 30% 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.

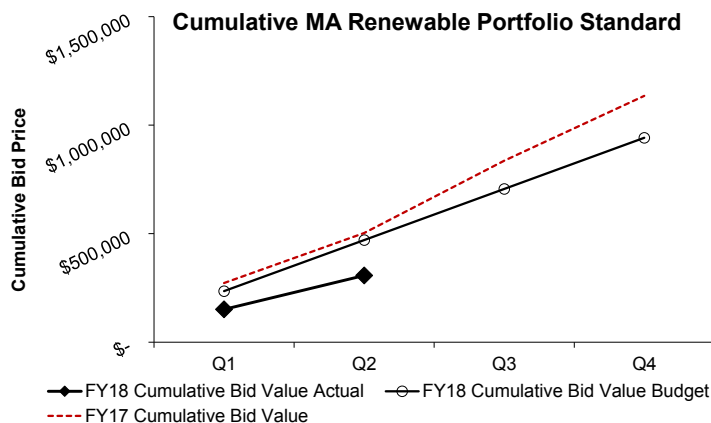
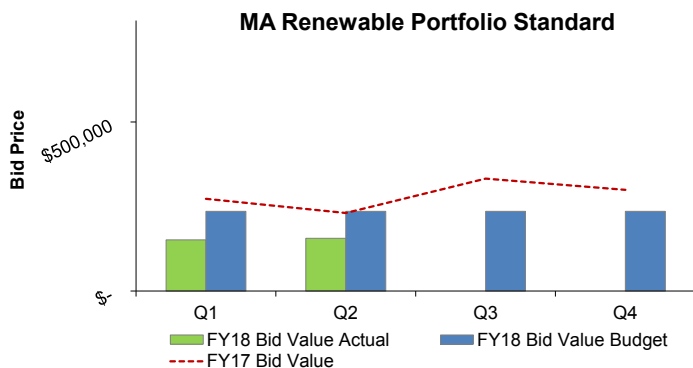
- Notes:
1. Only the actual energy prices are being reported. Therefore, some of the data lags up to 2 months due to timing of invoice receipt.
  2. Savings and Revenue: Savings refers to any/all renewable energy produced that is used on-site therefore saving the cost of purchasing that electricity, 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 - FY18

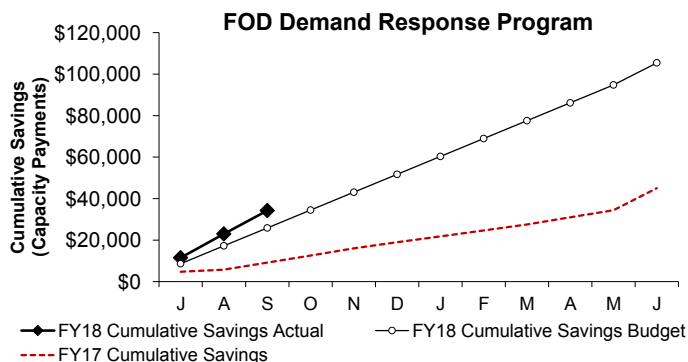
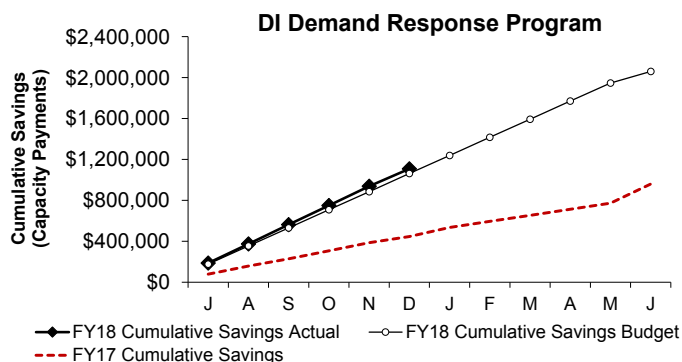


Savings and revenue from MWRA renewable electricity generation in the first 4 months of FY18 (actuals only through October<sup>1</sup>) is \$1,334,456; which is 19% below the budget<sup>3</sup>, partly due to the Cosgrove hydro generation values being underestimated by the utility (this will be reconciled in later months and will be reflected in future reporting), and the DI STGs being off-line or at reduced operation for annual maintenance in September. 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 Class 1, Class 2, and Solar REC renewable energy assets; 7,493 Q2 CY2017 Class I Renewable Energy Certificates (RECs), 1,252 Class II Q2 2017 RECS, and 100 Q2 CY2017 Solar RECs (SRECs) were sold for a total value of \$155,997 RPS revenue; which is 49% below budget<sup>3</sup> for the Quarter.

REC values reflect the bid value on the date that bids are accepted. Cumulative bid values reflects the total value of bids received to date.

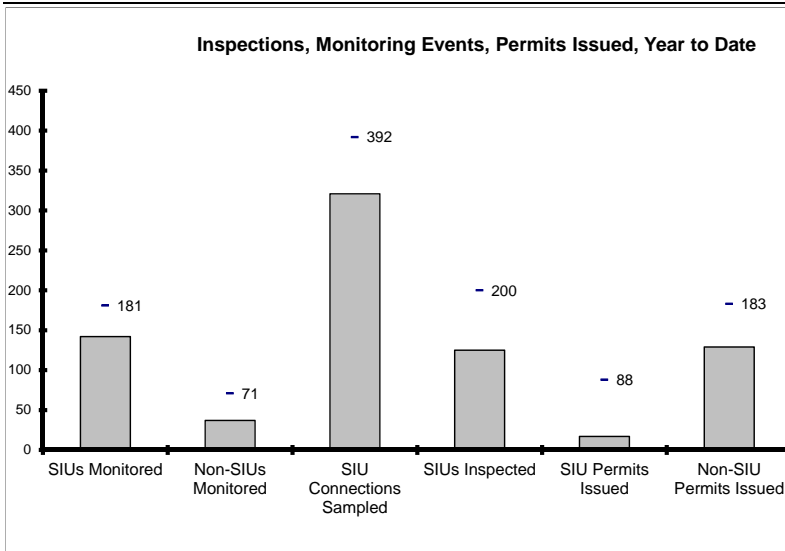


Currently Deer Island, JCWTP, and Loring Rd participate in the ISO-New England Demand Response Programs<sup>4</sup>. By agreeing to reduce demand and operate the facility generators to help reduce the ISO New England grid demand during periods of high energy demand, MWRA receives monthly Capacity Payments from ISO-NE. When MWRA operates the generators during an ISO-NE called event, MWRA also receives energy payments from ISO-NE. FY18 Cumulative savings (Capacity Payments only) through December<sup>1</sup> total \$1,108,550 for DI and \$34,216 for FOD through September<sup>1</sup>.

- Notes:
1. Only the actual energy prices are being reported. Therefore, some of the data lags up to 2 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 - FY18



EPA Required SIU Monitoring Events for FY18: 181  
YTD: **142**

Required Non-SIU Monitoring Events for FY18: 71  
YTD: **37**

SIU Connections to be Sampled For FY18: 392  
YTD: **321**

EPA Required SIU Inspections for FY18: 200  
YTD: **125**

SIU Permits due to Expire In FY18: 88  
YTD: **17**

Non-SIU Permits due to Expire for FY18: 183  
YTD: **129**

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

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

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	5	15	0	1	0	2	5	18
Aug	1	46	0	5	0	0	1	51
Sep	2	8	0	3	0	0	2	11
Oct	4	24	0	1	0	0	4	25
Nov	2	8	2	0	1	1	5	9
Dec	0	12	0	2	0	1	0	15
Jan							0	0
Feb							0	0
Mar							0	0
Apr							0	0
May							0	0
Jun							0	0
% YTD	82%	88%	12%	9%	6%	3%	17	129

In the 2nd Quarter of FY18, fifty-eight permits were issued, nine of which were SIUs. Six of the nine SIU permits were issued within 120 days- falling short of the EPA's 90% requirement. There were five non-SIU permits issued beyond the 120-day timeframe with two of them beyond the 180-day timeframe. TRAC has been undergoing personnel changes which has affected the workflow, resulting in delays in processing permits. Delays attributable to having to wait for data and/or approval from the municipality in which the industry was operating or intended to operate, mainly affect construction dewatering permits, but in some cases, new start-up industries.

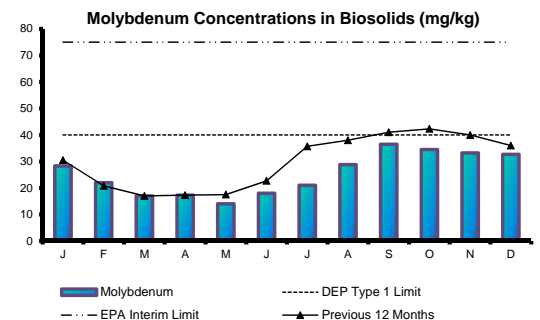
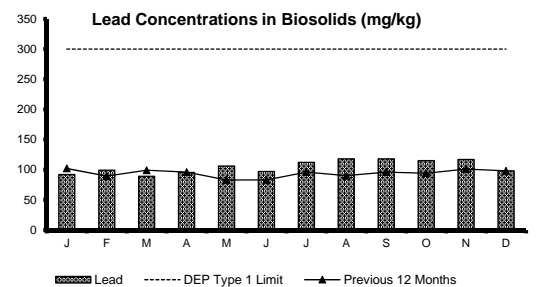
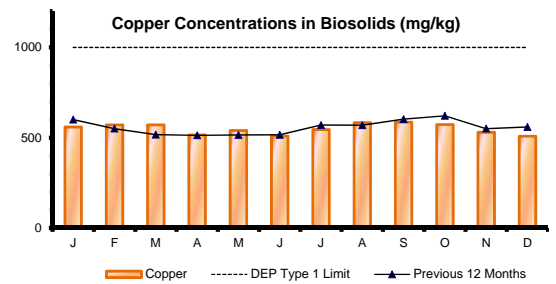
The new Clinton NPDES permit effective March 1, 2017, requires TRAC to issue/renew all industrial user control mechanisms within 90 days of their expiration date or within 180 days after the industry has been determined to be an SIU.

There were no Clinton SIU permits issued during the period.

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. The levels have been below the DEP Type 1 limit for all three metals.

So far, with the September 2016 change in the MassDEP regulations, increasing the molybdenum limits to 40 mg/kg for land use application, the MWRA has been 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 second quarter of this fiscal year, the levels of molybdenum have been below the current DEP limits and even more importantly, below the levels during the same period a year ago. MWRA and its contractor, NEFCO, do not distribute product that does not meet the suitability standards.



# Field Operations Highlights

## 2<sup>nd</sup> Quarter – FY18

### Western Water Operations and Maintenance

- Carroll Water Treatment Plant: Staff completed annual maintenance during the winter half plant shutdown of the A Side of the plant, and then disinfected and reactivated it. B side work will begin in January. Staff completed annual preventative maintenance on the UV system including cleaning quartz sleeves and replacing lamps.
- Aquatic Invasives Control: Seasonal drawdowns of Foss Reservoir and Chestnut Hill Reservoir to freeze/desiccate invasive plants commenced. A second plant fragment barrier was installed at Sudbury Reservoir.
- Aqueducts: Staff completed the annual maintenance tasks in areas designated as sensitive by MESA (Massachusetts Endangered Species Act) and that have limited windows for maintenance activities.

### Operations Engineering

Brutsch Water Treatment Facility Replacement SCADA Panel was delivered in December and new PLC Program and SCADA graphics are close to completion. All electrical, programming and transition work will be performed by in-house staff.

Boston 19 and Framingham: Staff developed a scope of services to upgrade SCADA system components at both sites. The procurement process has been initiated to obtain program services.

Contract #7532–Section 80 Repair: Section 80 was isolated for a duration of 2 weeks in order to install two 48-inch valves. This isolated Needham's and Wellesley's meters. Prior to the isolation, Operations Engineering met with both communities, as well as Weston, Newton and Dedham/ Westwood Water, to create an Emergency Action Plan (EAP) in case either community needed water during this period. The isolation was conducted and Weston helped supply Wellesley for a few days due to maintenance on one of their wells. The valves were installed successfully and there were no supply issues in either community. A bypass pipe was then installed and Section 80 was isolated and released to the Contractor.

Contract #7458-Beacon Street Waterline Repair: The warranty inspection for the Beacon Street line was conducted this month. A leak on this line was repaired using carbon fiber wrap. The inspection consisted of increasing flow through the line and putting a camera with sonic listening equipment into the live line. Prior to the test, a trial isolation of Boston Meter 60 was conducted.

There were no issues and the test proceeded. Unfortunately, the contractor has an equipment failure and the Beacon Street line was isolated to remove the equipment. There were no supply issues to Boston. The test is rescheduled for March.

Contract #7161-Chelsea Creek Headworks: Operations Engineering coordinated with Construction to allow the Contractor to drive piles in the vicinity of MWRA Section 37. This water main supplies portions of Chelsea and East Boston. An emergency isolation plan was in place prior to driving the piles. During the work, a leak surfaced on this main at the facility site. The leak was at a coupling and the line was isolated for less than 24 hours during the repair. The affected communities were notified prior to the isolation. There were no water supply issues.

Contract #6457-Spot Pond Covered Storage Tank: The warranty work required under this contract was conducted. The leakage test and the dive inspection required a cell to be out of operation during the work. One cell was isolated at a time. Water to supply was not affected. Both tests were conducted and passed.

EAP for Metro Tunnels: Operations Engineering and Planning are finalizing plans for the reconfiguration of the system during a tunnel isolation. Training was conducted in for both Senior Staff and Operations and Engineering staff, providing an overview of how to reconfigure the system to supply MWRA communities if the City Tunnel, City Tunnel Extension or the Dorchester Tunnel must be isolated.

Bellevue Tank 1: This tank was successfully disinfected and placed back into service. This steel standpipe has been in off-line for years as it is 25 feet lower than Bellevue Tank 2. It is now active in case of emergency and the water quality is maintained by periodically pumping into the system.

Meter 34 in Medford at Station Landing: This new meter for Medford was successfully pressure tested and disinfected, and will be activated in January.

### SCADA & Process Control

- Metro Process Control: Monitored dosing rates, coordinated deliveries and supported the end of the season deactivation for the chemical system at Framingham Pump Station. Coordinated the evaluation of the Framingham H2S monitoring sites. Coordinated the replacement of carbon at Braintree/Weymouth Replacement Pump Station and Hough's Neck Pump Station. Supported additional testing of the Nut Island Headworks Odor Control System. Continued to monitor the Nut Island Headworks Odor Control System. Finalized the plan and installed equipment to provide H<sub>2</sub>O<sub>2</sub> addition at Braintree/Weymouth Relief Pump Station for Nut Island Headworks odor control, if necessary. Developed a scope of work for carbon replacement at Braintree Weymouth IPS. Developed a scope of work for the inspection of the Stony Brook Outfalls (MWR023). Supported the Spot Pond Facility Warranty Testing. Provided technical support for Commonwealth Avenue Pump Station Upgrade Project.



# Field Operations Highlights

## 2<sup>nd</sup> Quarter – FY18

Continued process book development for water and wastewater facilities. Service contract procurement, management and closeout is ongoing.

### Metering

- Planning: Staff worked with MIS and Telog Vendor to build, test and prepare for deployment of newest virtual hosted Meter Data System.
- Engineering: Staff provided guidance to a contractor during construction of new Reading water meters. Assisted Dedham/Westwood water with troubleshooting water meter site. Maintained temporary water meter to Arlington.
- Community Assistance: Assisted Malden, Quincy, Revere, Waltham, Somerville, Chelsea, Marblehead, and Milton with their higher than normal water usage.

### TRAC

- Compliance Staff issued 25 Notices of Noncompliance, 10 Notices of Violation, 1 Ruling on Request for Reconsideration, and 3 Return to Permit Letters. We continue to negotiate resolutions to several high-level enforcement matters, and to resolve several appeals.
- TRAC's annual bills to sewer use discharge permit holders were issued on November 23, 2017. The amount invoiced totaled \$2,032,590. Permittees have 30 days to pay and/or appeal the charges.
- MWRA submitted the Annual Industrial Waste Report detailing its pretreatment activities to US EPA and Mass DEP as required by our NPDES Permits for the Clinton and Deer Island WWTPs by its October 31, 2017 due date.

### Environmental Quality-Water

#### Community Support:

- Staff trained or re-trained several communities in proper water sampling procedures throughout the 2<sup>nd</sup> Quarter.
- Staff provided sampling support to Everett on November 28<sup>th</sup> in response to an *E. coli* positive sample collected on November 27<sup>th</sup>. Repeat sampling did not find presence of total coliform or *E. coli* thus avoiding a Boil Water Order.
- On December 18<sup>th</sup>-19<sup>th</sup>, Staff assisted Framingham with collection and testing of potability samples for their new Indian Head Storage Tank. The samples met all water quality standards and the tank was activated.

#### Contaminant Monitoring System

- All buoys were removed from the Wachusett Reservoir in November. Calibration checks and corrective

maintenance were performed in preparation for winterization.

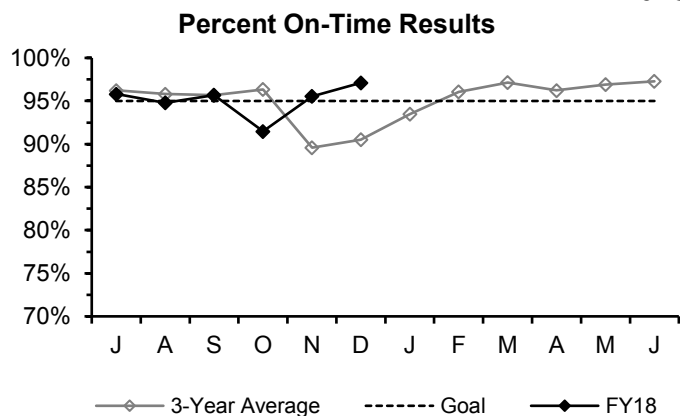
- Staff successfully deployed the Mobile S::CAN Trailer during a practice drill at the Sudbury Reservoir on October 19<sup>th</sup>. The pumping system and hydraulics were tested and S::CAN Unit readings from the mobile trailer were found to match the grab samples collected.
- On November 28<sup>th</sup>, a dive inspection of the Intake lines for the CMS in the Wachusett Reservoir, performed by State Police divers, revealed all three intake lines were at the bottom of the Reservoir due to a failed spot-weld. Failure of the intake line has caused rapid fouling of the online sensors and repeated site visits to minimize impact to the S::CAN Unit. Short-and long-term responses are being evaluated

### Environmental Quality-Wastewater

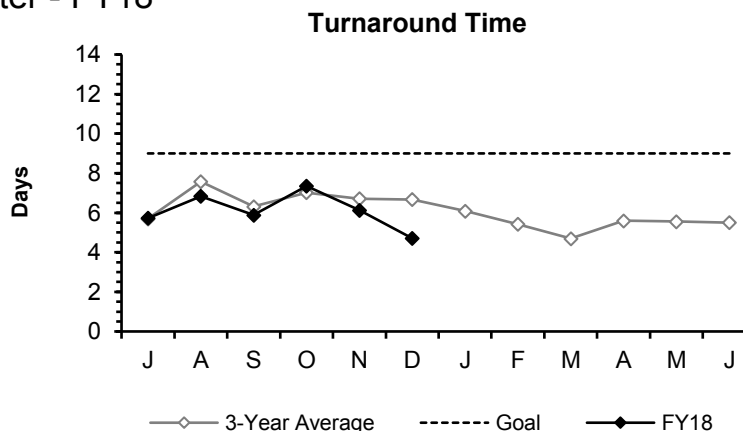
- Ambient Monitoring: The final three Water Quality Monitoring Surveys were completed which wrapped up sampling for 2017. Analysis of samples collected in 2017 continued. MWRA's annual summary of permit-required monitoring was presented to the Board in October and was submitted to EPA as required by November 15<sup>th</sup>.
- Harbor/CSO Monitoring: CSO receiving water monitoring continued in support of the water quality standards variance and the CSO assessment, including extended weekend and holiday sampling and some CSO facility influent sampling. Biweekly harbor wide monitoring continued through the year. Two new sampling locations were added to the Alewife Brook in October.
- Cooperation with Other agencies: Staff convened a session at the biennial conference of the Coastal & Estuarine Research Federation. Several staff presented papers and/or attended the conference; presented results of MWRA's annual monitoring summary to a meeting of the Advisory Board; and presented on the NPDES Permit process to the Wastewater Advisory Committee. Staff participated in a meeting on Kings' Beach hosted by Save the Harbor/Save the Bay. Staff convened an annual technical meeting with watershed associations and the Department of Laboratory Services.

## Laboratory Services

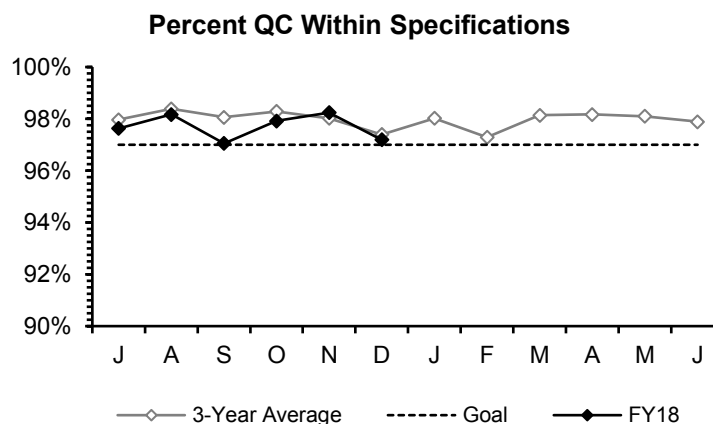
2nd Quarter - FY18



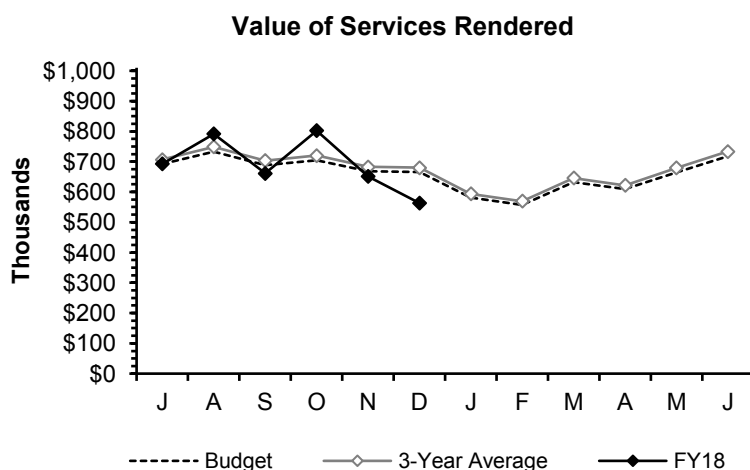
The Percent On-Time measurement was above the 95% goal two months of the quarter. All regulatory reporting deadlines were met.



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



Percent of QC tests meeting specifications was above the 97% in-house goal three months of the quarter.



Value of Services Rendered was below the seasonally adjusted budget projection due to few School Lead samples and the conclusion of 2017 Harbor and Outfall Monitoring. Year to date we are slightly above the budget projection.

### Highlights:

Two peer-reviewed publications were published in December: "Free Cyanide Forms During Determination of Free Cyanide in Drinking Water" by Delaney and Blodgett in the Journal of the AWWA, and "A Look at Matrix Effects" by Delaney in LC/GC North America.

### Quality Assurance:

The biennial DEP lab certification audit of the Chelsea Lab had no significant findings. The quarterly rolling audit on chain of custody practices found good compliance with requirements.

### CSO Assessment:

We continued to perform weekend CSO receiving water sampling in the Charles and Mystic Rivers during/after significant wet weather events. This is intended to give additional data for the CSO Assessment to document the recovery of the rivers after it rains. In October this included a rare activation of the Cottage Farm CSO facility, which also included testing CSO facility influent as a surrogate for untreated CSO discharge.

**Clinton:** Rush iron tests to support phosphorus removal performance testing.

**DITP:** Tested special samples for a North Met Sewer study.

### Drinking Water:

Outside lab contracts for required upcoming Unregulated Compound Monitoring Rule (UCMR4) testing are in place. Applied to EPA to perform testing for Bromide and Total Organic Carbon for UCMR4.

### Mobile Lab:

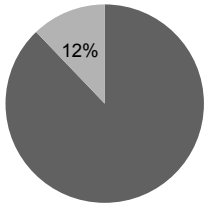
Successfully participated in an ESU site characterization and sample retrieval drill at Bear Hill Tank. The staff and instruments performed as expected.

# CONSTRUCTION PROGRAMS

# Projects In Construction

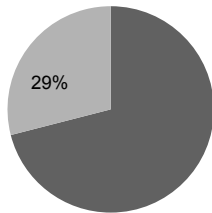
## 2<sup>nd</sup> Quarter – FY18

### Money



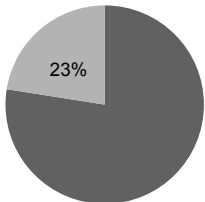
■ Amount Remaining  
■ Billed to Date

### Time



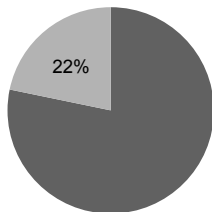
■ Days Remaining  
■ Days Expended

### Money



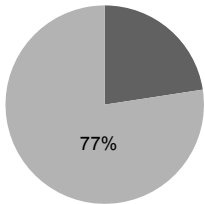
■ Amount Remaining  
■ Billed to Date

### Time



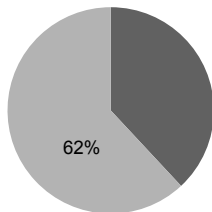
■ Days Remaining  
■ Days Expended

### Money



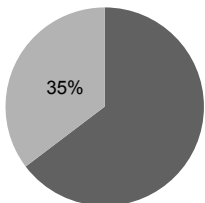
■ Amount Remaining  
■ Billed to Date

### Time



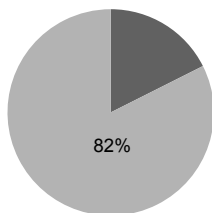
■ Days Remaining  
■ Days Expended

### Money



■ Amount Remaining  
■ Billed to Date

### Time



■ Days Remaining  
■ Days Expended

### Reading Extension Sewer Rehabilitation

*Project Summary:* This project involves the rehabilitation of 10,820-linear feet of the Reading Extension Sewer and 2,280-linear feet of the Metropolitan Sewer and 62 associated manholes/structures.

*Notice to Proceed:* 10-Aug-2017 *Contract Completion:* 10-Dec-2018

*Status and Issues:* During the month of December, the Contractor performed a heavy cleaning, CCTV inspection and pipe size/length confirmation for approximately 4,000 linear feet of pipe. They replaced frames and covers for 10 manholes and final top coat paving for 7.

### 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, demo Contractor set up containment on the mezzanine and began remediation where the duct work had been removed on the east wall. They also began remediation of odor control room and 1<sup>st</sup> floor entry hall. The electrical contractor began installing conduit for electrical feeds, signal and fire alarm on the operating level and first floor.

### 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 completed the installation of the 120" PCCP Wachusett Aqueduct Overflow Extension and surge tank. They backfilled and compacted at the west side of the pump station and east thrust block. They continued with the installation of the slide weir gates along line A. They also repaired they concrete surface defects.

### 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.

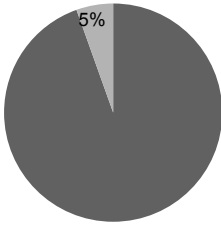
*Notice to Proceed:* 29-Jan-2016 *Contract Completion:* 31-May-2018

*Status and Issues:* As of December, the Contractor erected containment for Phase-3 of PCB abatement in the pump room. Installed run indicator beacon on the diesel bypass pumps and temporary lighting around bypass pumps and inside the screen room . They also modified temporary heat in the screen room.

# Projects In Construction

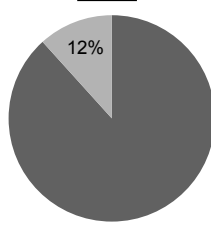
## 2<sup>nd</sup> Quarter – FY18

### Money



- Amount Remaining
- Billed to Date

### Time



- Days Remaining
- Days Expended

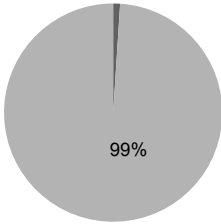
### NIH Section 110 - Stoneham

Project Summary: This project consists of the replacement of 14,000 linear feet of 48-inch diameter transmission main in the Town of Stoneham.

Notice to Proceed: 5-Sep-2017 Contract Completion: 1-Jun-2020

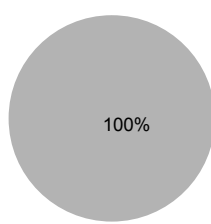
Status and Issues: As of December, the Contractor continued CCTV of remaining sewer mains in advance of CIPP liner on 12/18 & 12/19. They installed 47 L.F. 48" DIP, 1-48" 11 1/4" Bend, 2- 48" 45° Bends on Cottage Street. A coordination and field meeting with NGid to discuss gas main relocations was held on 12/21.

### Money



- Amount Remaining
- Billed to Date

### Time



- Days Remaining
- Days Expended

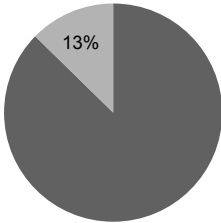
### DITP Valves and Piping Replacements

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-Sep-2017

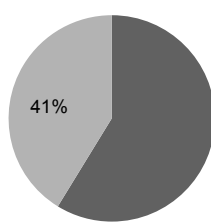
Status and Issues: The Contractor achieved Substantial Completion by the Contract End Date of 9/20/17. They commenced cleanup and demobilization and are addressing punchlist items.

### Money



- Amount Remaining
- Billed to Date

### Time



- Days Remaining
- Days Expended

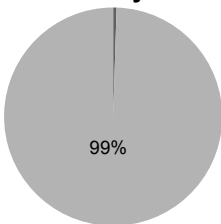
### Winthrop Terminal VFD and Motor

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

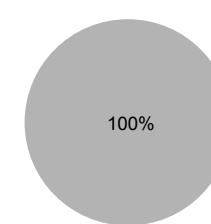
Status and Issues: During December, the first VFD and motor was shop tested and shipped to the storage compound. Demolition of VFD No 6 to start beginning of January 2018

### 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: This project is complete.

## CSO CONTROL PROGRAM

2nd Quarter – FY18

All 35 projects in the Long-Term CSO Control Plan are complete, in compliance with Schedule Seven. Of the \$910.6 million budget in the FY18 CIP for the CSO Control Program, approximately \$7.0 million remains to be spent through 2021.

Project/Item	Status as of December 31, 2017
BWSC Dorchester Interceptor Inflow Removal	MWRA’s CIP and the MOU/FAA with BWSC included \$5.4 million for additional inflow removal from the BWSC Dorchester Interceptor system in the South Dorchester Bay Sewer Separation area, of which \$1.7 million was transferred to the BWSC MOU/FAA CSO account and \$1.6 million of that was withdrawn by BWSC to fund related design and construction work. On May 17, 2017, MWRA’s Board of Directors authorized removing the remaining \$3.8 million from the BWSC MOU/FAA (which ended on June 30, 2017) and including this funding amount in a separate, 4-year financial assistance agreement with BWSC effective July 1, 2017. The new agreement limits the financial assistance to reimbursement of the eligible cost of construction work approved by MWRA.
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, and attained substantial completion of related surface restoration work by the end of 2017. MWRA made a final transfer of funds to the Cambridge CSO account in December 2017, in the amount of \$1,254,551, to cover eligible costs (certain past and future) through June 30, 2018, when the MOU/FAA is scheduled to end. Over the remaining term, Cambridge will continue to complete punch list items and close out its construction contracts, as well support MWRA’s final eligibility reviews.
MWRA CSO Performance Assessment	MWRA issued the Notice to Proceed with the contract for CSO Post-Construction Monitoring and Performance Assessment to AECOM Technical Services, Inc., on November 8, 2018, in advance of and in compliance with the January 2018 milestone in Schedule Seven. The contract includes CSO inspections, metering, hydraulic modeling, system performance assessments and water quality compliance assessments culminating in the submission of a report on results to EPA and DEP in December 2020, in compliance with the last milestone in Schedule Seven. AECOM has completed initial coordination with the CSO communities (BWSC, Cambridge, Chelsea and Somerville) and has commenced inspections of more than 200 CSO regulator structures in part to develop plans for the installation of temporary (27 months) CSO meters by April 1, 2018. The contract not-to exceed amount is \$2.92 million, and MWRA’s FY18 CIP budget also includes \$300,000 for as-needed technical, permitting and regulatory support.

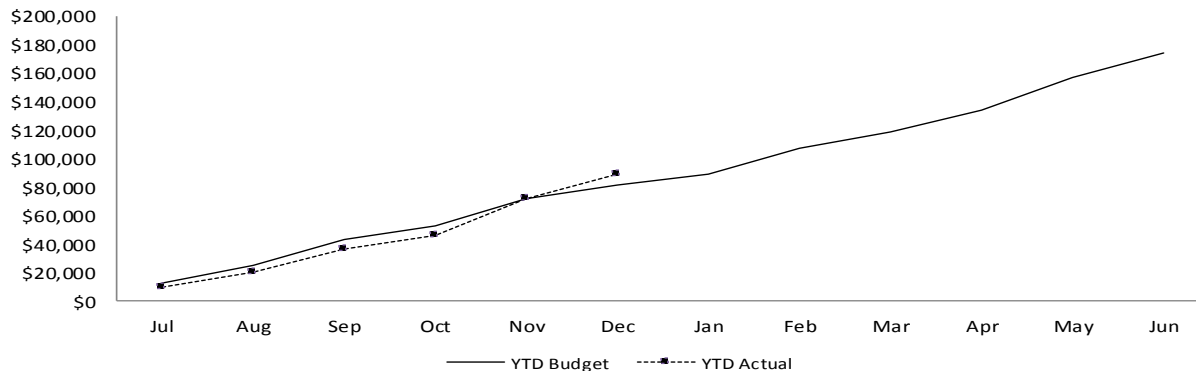
## CIP Expenditures 2<sup>nd</sup> Quarter – FY18

FY18 Capital Improvement Program Expenditure Variances through December by Program (\$ in thousands)				
Program	FY18 Budget Through December	FY18 Actual Through December	Variance Amount	Variance Percent
Wastewater	37,734	39,842	2,108	6%
Waterworks	40,677	48,172	7,495	18%
Business and Operations Support	2,783	1,050	(1,733)	-62%
<b>Total</b>	<b>\$81,194</b>	<b>\$89,064</b>	<b>\$7,870</b>	<b>10%</b>

Project overspending within Wastewater was due to greater than budgeted community requests for grants and loans, and progress on the Chelsea Creek Headworks Upgrade Construction, and Study of Sections 186, 4, 5 contracts. This was partially offset by construction delays related to bypass pumping for the Alewife Brook Pump Station Construction, construction delays for the Clinton Phosphorus Reduction contract, as well as work anticipated for FY18 that was completed in FY17 for the Deer Island Digester Sludge Pump Replacement Construction Phase 2 and the Deer Island Fuel Oil System Upgrades, timing of receiving equipment for the Winthrop Terminal Facility VFD Replacements, less than anticipated progress for the Clarifier Rehabilitation Phase 2 contracts, and updated cost estimates for final work on the Cambridge Sewer Separation project. Project overspending in Waterworks was due to construction progress for the Northern Intermediate High Phase 1C Construction, Southern Extra High Section 111 Construction 1, Wachusett Pump Station Construction, Marlborough Maintenance Facility, timing of watershed land purchases, greater than anticipated requests for community loans, and progress on work for the Weston Aqueduct Supply Mains Design/MEPA/REI contract. This was partially offset by delay in Notices to Proceed for Southern Extra High Section 111 Construction 2 and Chestnut Hill Gatehouse #1 Repair contracts, and delay in pipe installation for Section 14 Pipe Relocation.

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

*Total FY18 CIP Budget of \$174,539*



### Construction Fund Management

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

Cash Balance as of 12/23/2017	\$55.7 million
Unused capacity under the debt cap:	\$1.406 billion
Estimated date for exhausting construction fund without new borrowing:	MAY-18
Estimated date for debt cap increase to support new borrowing:	Not anticipated at this time
Commercial paper/Revolving loan outstanding:	\$178 million
Commercial paper capacity / Revolving Loan	\$ 350 million
Budgeted FY18 capital spending*:	\$160 million

\* Cash based spending is discounted for construction retainage.

# DRINKING WATER QUALITY AND SUPPLY



## Source Water – Microbial Results and UV Absorbance

2nd Quarter – FY18

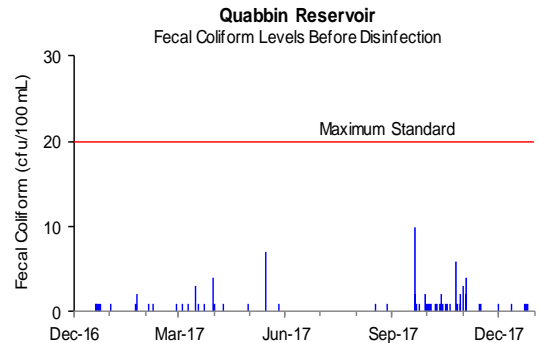
### Source Water – Microbial Results

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%.**

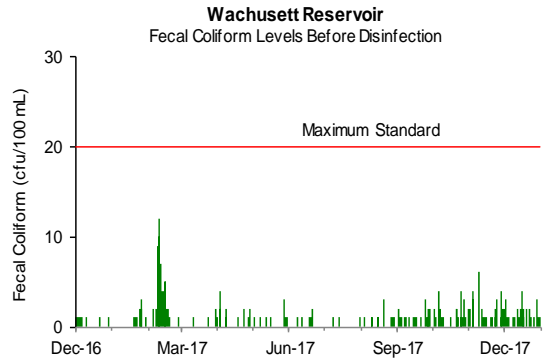


#### Sample Site: Wachusett Reservoir

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.**

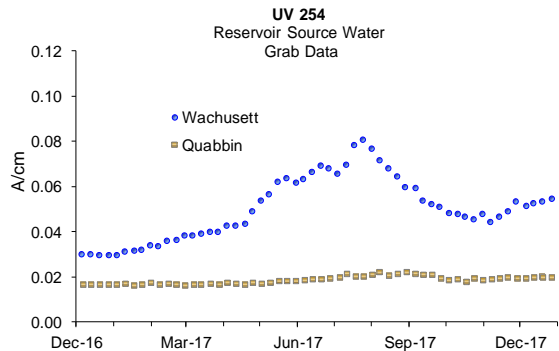


### Source Water – UV Absorbance

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 0.020 A/cm.

Wachusett Reservoir UV-254 levels are currently around 0.055 A/cm.



## Source Water – Turbidity

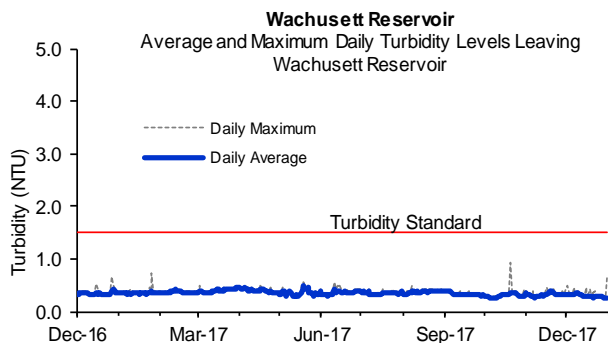
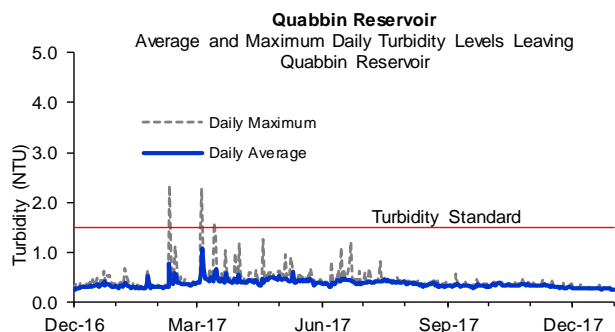
2nd Quarter – FY18

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 five NTU (Nephelometric Turbidity Units), and water only can be above one 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.

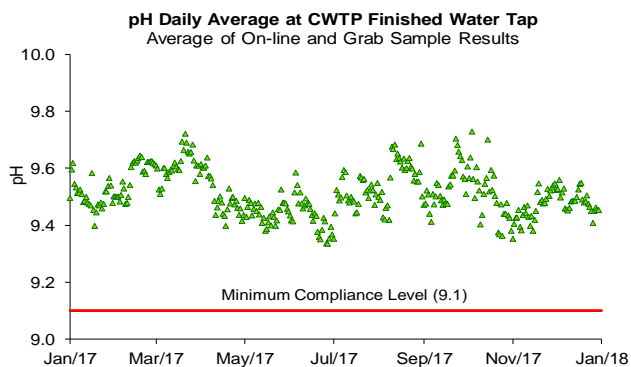
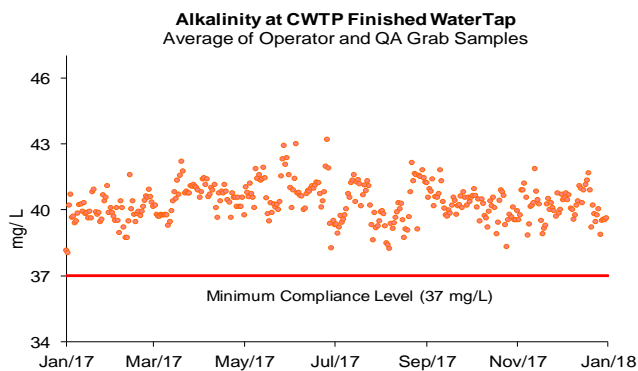


## Treated Water – pH and Alkalinity Compliance

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 6 and 7, 2017. Distribution system sample pH ranged from 9.1 to 9.7 and alkalinity ranged from 38 to 42 mg/L. No sample results were below DEP limits for this quarter.



## Treated Water – Disinfection Effectiveness

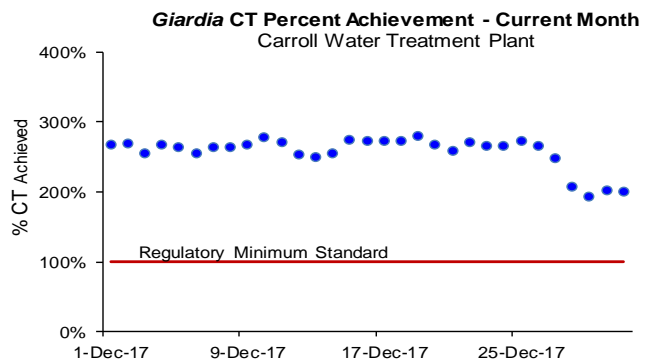
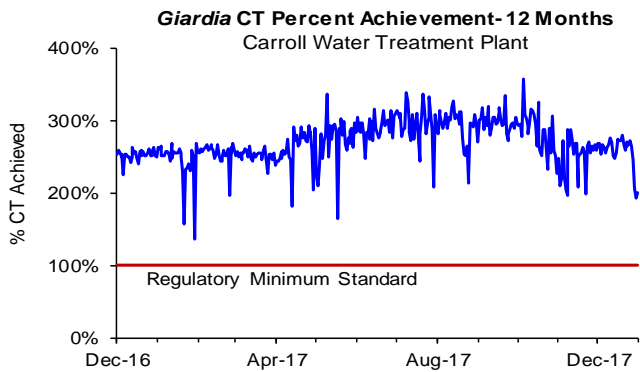
2nd Quarter – FY18

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

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

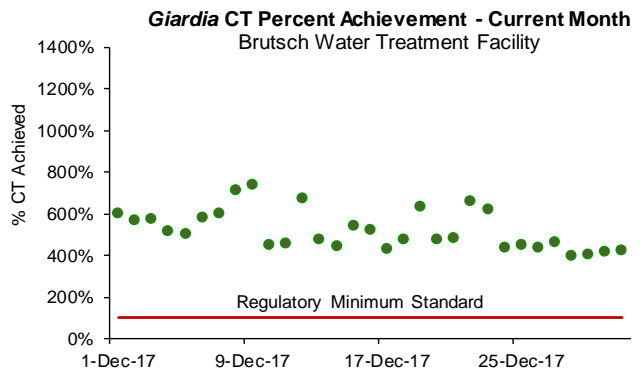
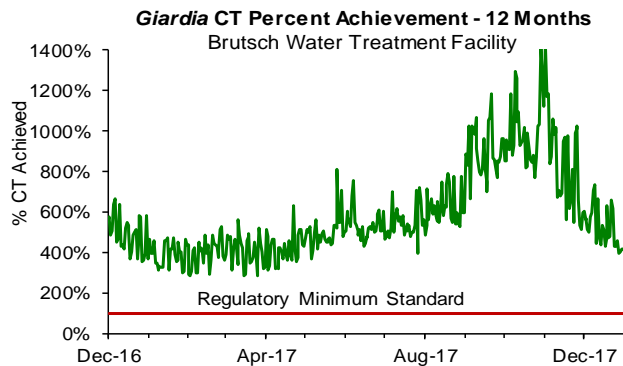
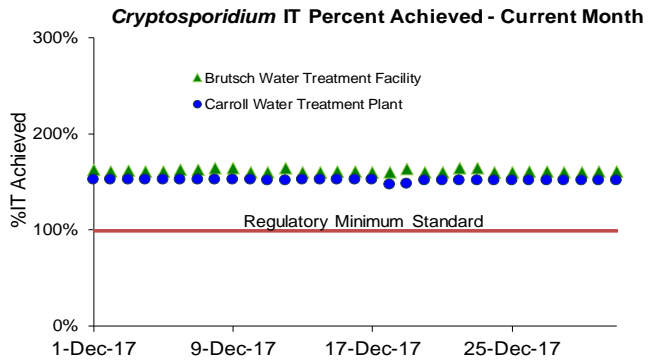
### Wachusett Reservoir – MetroWest/Metro Boston Supply:

- Ozone dose at the CWTP varied between 1.4 to 2.0 mg/L for the quarter.
- Giardia* CT was maintained above 100% at all times the plant was providing water into the distribution system this quarter, as well as every day for the last fiscal year.
- Cryptosporidium* IT was maintained above 100% during the month. Off-spec water was less than 5%.



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

- The chlorine dose at BWTF is adjusted in order to achieve MWRA's seasonal target of >0.75 mg/L (November 01 – May 31) and >1.0 mg/L (June 1– October 31) at Ludlow Monitoring Station.
- The chlorine dose at BWTF varied between 1.4 to 1.8 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%.



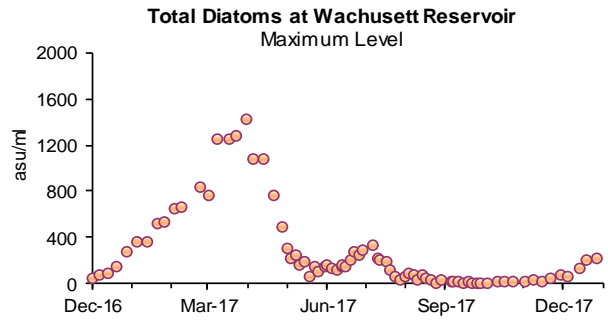
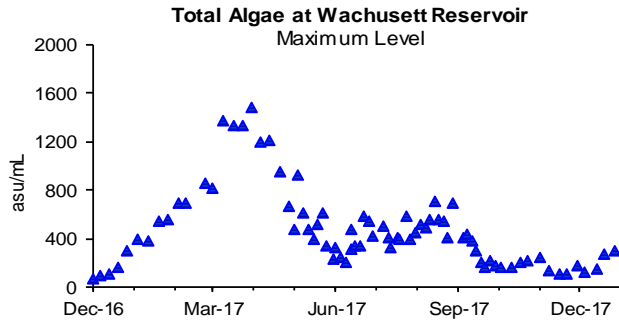
## Source Water - Algae

### 2nd Quarter – FY18

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.



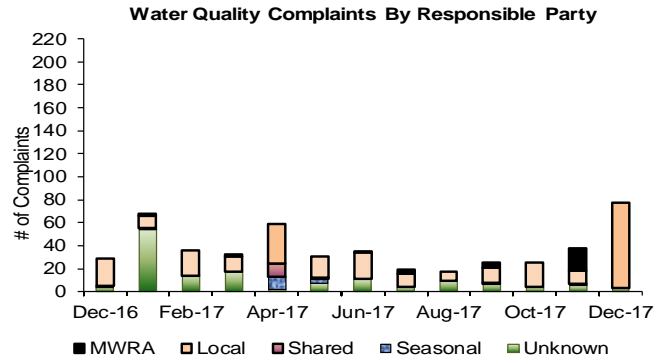
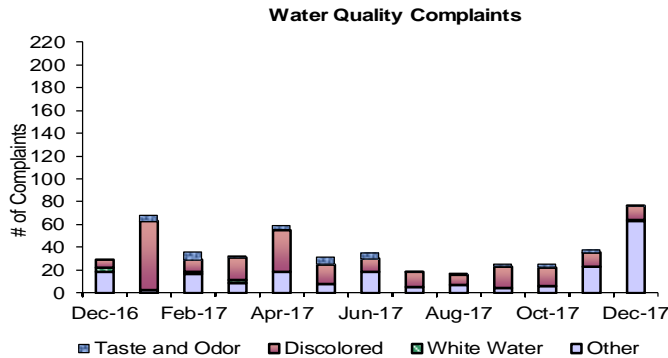
## Drinking Water Quality Customer Complaints: Taste, Odor, or Appearance

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 139 complaints during the quarter compared to 232 complaints from 2nd Quarter of FY17. Of these complaints, 40 were for "discolored water", 7 were for "taste and odor", 1 was for "white water", and 91 were for "other". Of these complaints, 105 were local community issues, 20 were MWRA related, 2 were seasonal in nature, and 12 were unknown in origin.

On December 27, Arlington received 50 no water complaints when isolating a zone to fix a water main break. The remaining complaints were scattered amongst the communities.



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

2<sup>nd</sup> Quarter – FY18

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.

Samples are tested for total coliform and 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 repeat tests confirm the presence of *E.coli* or total coliform.

Total coliform provide a general indication of the sanitary condition of a water supply. If total coliform are detected in more than 5% of samples in a month (or if more than one sample is positive when less than 40 samples are collected), the water system is required to investigate the possible source/cause with a Level 1 or 2 Assessment, and fix any identified problems.

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, fifty-two of the 6,305 community samples (0.82% system-wide) submitted to MWRA labs for analysis tested positive for total coliform. Four of the 1,929 Shared community/MWRA samples (0.21%) tested positive for total coliform. In October and November, Bedford had more than one positive total coliform sample and, therefore, was required to conduct a Level 2 Assessment. In October and November, Hanscom AFB had more than one positive total coliform sample and, therefore, was required to conduct a Level 1 Assessment in October and a Level 2 Assessment in November. In October, Needham had greater than 5.0% of their samples that were total coliform positive and, therefore, was required to conduct a Level 1 Assessment. In October, two samples in Newton tested positive for *E.coli*, but all repeat samples were clear. Newton did not have to perform an Assessment. In November, one sample in Everett tested positive for *E.coli*, but all repeat samples were clear. Everett did not have to perform an Assessment. Only 4.0% of the samples had a chlorine residual lower than 0.2 mg/L for the quarter. No community violated the TCR.

		# Coliform Samples (a)	Total Coliform # (%) Positive	E.coli # Positive	Assessment Required <sup>e</sup>	Violation <sup>f</sup>	Minimum Chlorine Residual (mg/L)	Average Chlorine Residual (mg/L)	
MWRA	d	MWRA Locations	344	0 (0%)	0		2.05	2.75	
		Shared Community/MWRA sites	1585	4 (0.25%)	0		0.07	2.23	
		<b>Total: MWRA</b>	<b>1929</b>	<b>4 (0.21%)</b>	<b>0</b>		<b>0.07</b>	<b>2.34</b>	
Fully Served		ARLINGTON	155	0 (0%)	0		0.00	1.78	
		BELMONT	107	1 (0.93%)	0		0.07	1.66	
		BOSTON	780	0 (0%)	0		0.03	2.63	
		BROOKLINE	224	0 (0%)	0		0.15	2.24	
		CHELSEA	169	0 (0%)	0		1.13	2.48	
		DEER ISLAND	52	0 (0%)	0		2.14	2.41	
		EVERETT	175	2 (1.14%)	1	No	0.17	1.87	
		FRAMINGHAM	238	1 (0.42%)	0		0.25	2.10	
		LEXINGTON	117	0 (0%)	0		0.81	2.31	
		LYNNFIELD	18	0 (0%)	0		0.13	0.87	
		MALDEN	237	1 (0.42%)	0		0.02	1.97	
		MARBLEHEAD	72	0 (0%)	0		0.08	2.06	
		MEDFORD	224	1 (0.45%)	0		1.29	1.99	
		MELROSE	117	0 (0%)	0		0.58	1.90	
		MILTON	102	0 (0%)	0		0.58	1.82	
		NAHANT	30	0 (0%)	0		0.75	1.98	
		NEWTON	285	3 (1.05%)	2	No	0.10	2.16	
		NORTHBOROUGH	48	0 (0%)	0		0.05	1.43	
		NORWOOD	99	0 (0%)	0		0.12	1.67	
		QUINCY	299	0 (0%)	0		0.04	1.73	
		READING	130	0 (0%)	0		0.11	1.49	
		REVERE	180	0 (0%)	0		1.62	2.16	
		SALGUS	96	0 (0%)	0		1.41	1.86	
		SOMERVILLE	282	3 (1.06%)	0		1.20	2.40	
		SOUTHBOROUGH	35	0 (0%)	0		0.19	2.14	
		STONEHAM	94	1 (1.06%)	0		1.26	2.37	
		SWAMPSCOTT	55	0 (0%)	0		0.61	1.56	
		WALTHAM	216	0 (0%)	0		0.28	2.27	
		WATERTOWN	130	0 (0%)	0		0.32	1.94	
		WESTBORO HOSPITAL	15	0 (0%)	0		0.05	0.40	
		WESTON	45	0 (0%)	0		0.51	2.51	
		WINTHROP	72	0 (0%)	0		0.04	1.71	
		<b>Total: Fully Served</b>	<b>4898</b>	<b>13 (0.27%)</b>	<b>0</b>				
CVA & Partially Served		BEDFORD	84	23 (27.38%)	0	Level 2	No	0.07	1.30
		CANTON	90	1 (1.11%)	0			0.03	1.22
		HANSCOM AFB	46	10 (21.74%)	0	Level 1 & 2	No	0.50	1.41
		MARLBOROUGH	126	0 (0%)	0			0.02	2.38
		NEEDHAM	132	3 (2.27%)	0	Level 1	No	0.02	0.65
		PEABODY	218	0 (0%)	0			0.20	2.05
		WAKEFIELD	151	0 (0%)	0			0.90	1.76
		WELLESLEY	123	0 (0%)	0			0.03	0.75
		WILMINGTON	85	0 (0%)	0			0.04	1.60
		WINCHESTER	91	0 (0%)	0			0.10	1.60
		WOBURN	201	2 (1.00%)	0			0.08	0.94
		SOUTH HADLEY FD1	60	0 (0%)	0			0.03	0.48
		<b>Total: CVA &amp; Partially Served</b>	<b>1407</b>	<b>39 (2.77%)</b>	<b>0</b>				
		<b>Total: Community Samples</b>	<b>6305</b>	<b>52 (0.82%)</b>	<b>0</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 – FY18

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.

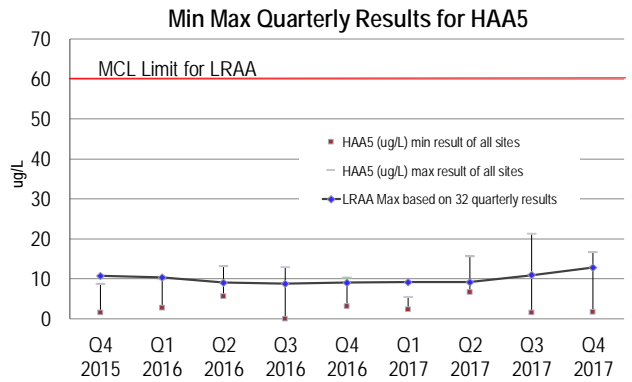
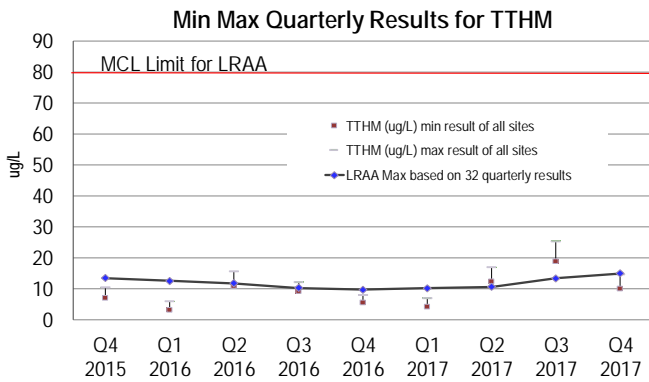
The locational running annual average at each individual sampling location must be below the standard. The charts below show the highest and lowest single values for all sites, and the LRAA of the highest location each quarter.

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).

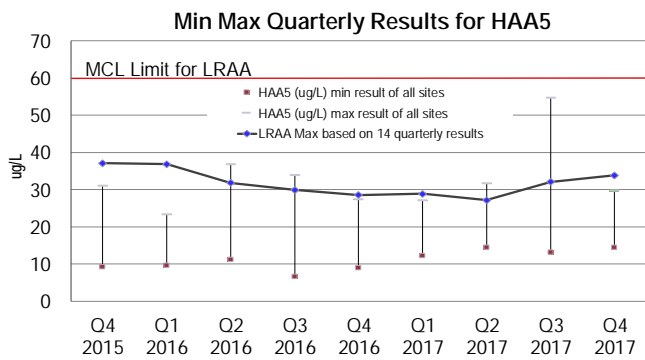
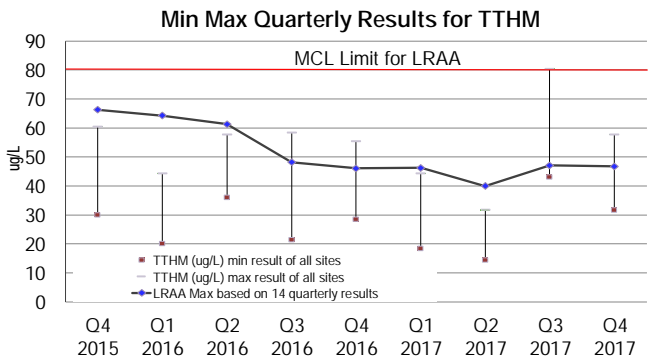
Bromate is tested monthly per DEP requirements for water systems that treat with ozone. Bromide in the raw water may be converted into bromate following ozonation. EPA's RAA MCL standard for bromate is 10 µg/L.

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 = 15.0 µg/L; HAA5s = 12.8 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

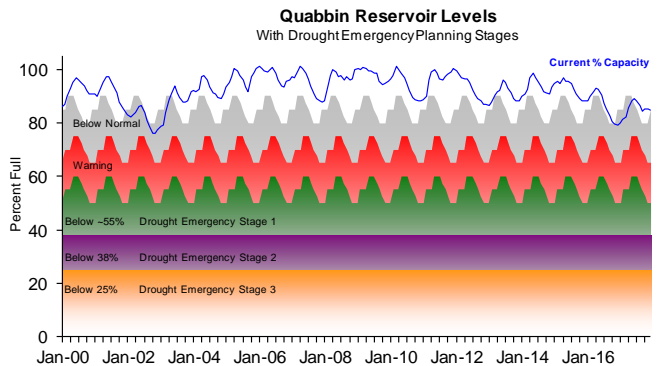
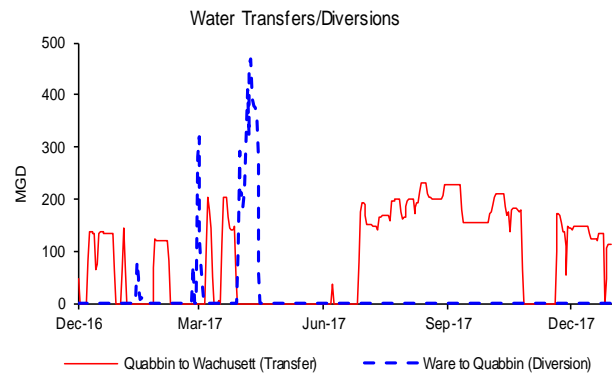
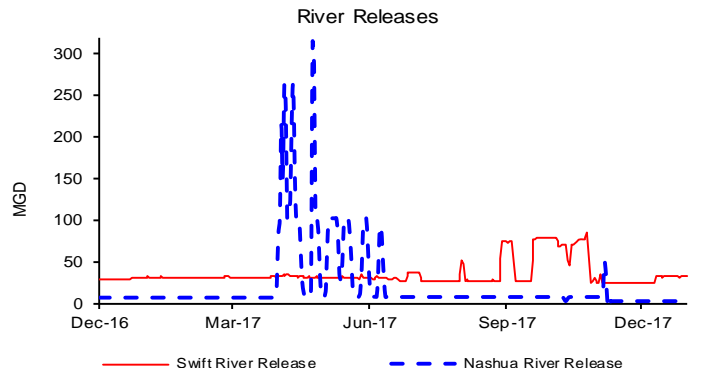
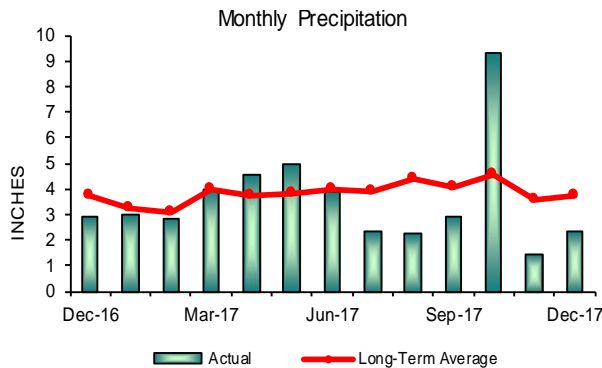
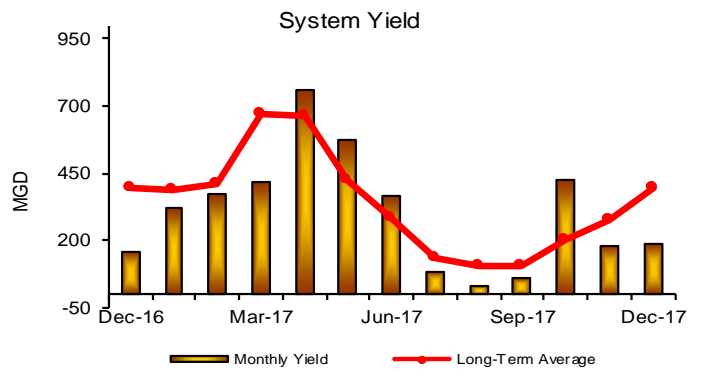
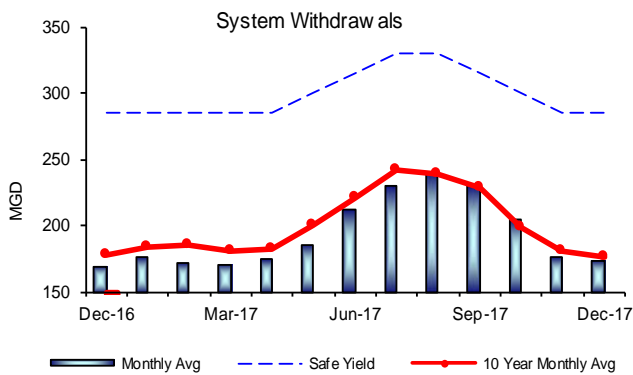
2nd Quarter – FY18

## 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

The volume of the Quabbin Reservoir was at 84.9% as of December 31, 2017; a 0.5% increase for the quarter, which represents a gain of 2.0 billion gallons of storage. Precipitation for the quarter was above the long term average. Yield for the quarter was below the quarterly long term average. System withdrawal for the quarter was below the 10 year monthly average.



# WASTEWATER QUALITY

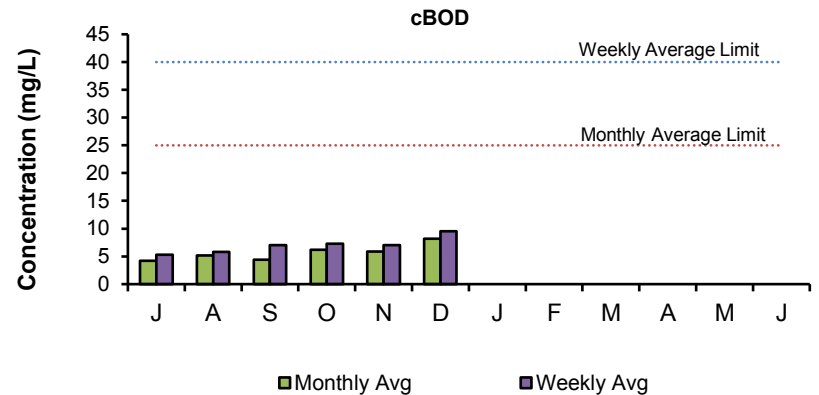
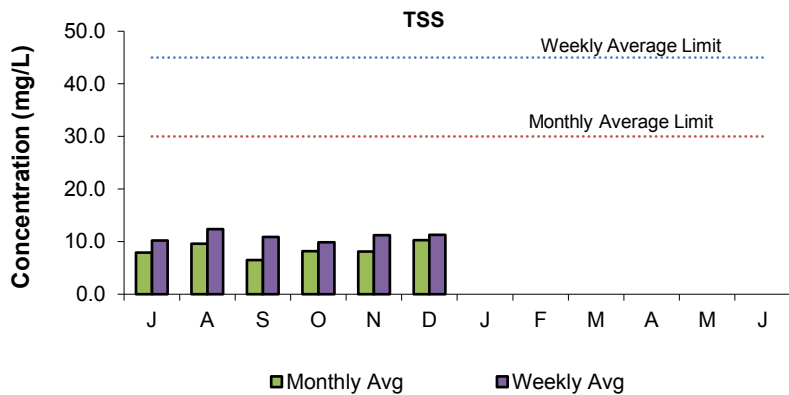


## NPDES Permit Compliance: Deer Island Treatment Plant 2nd Quarter - FY18

### NPDES Permit Limits

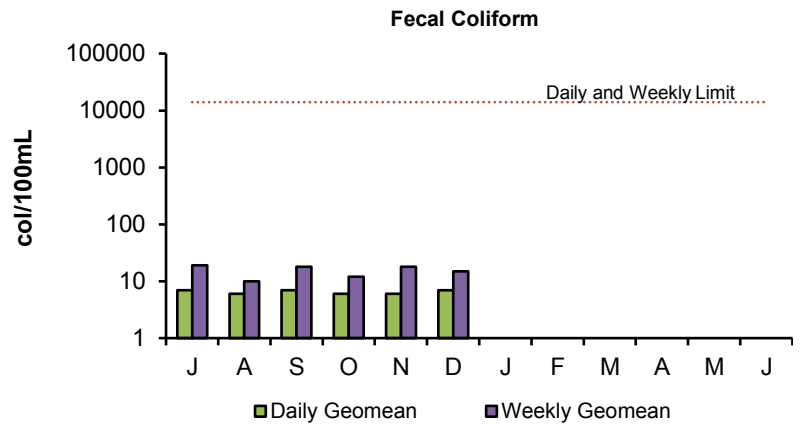
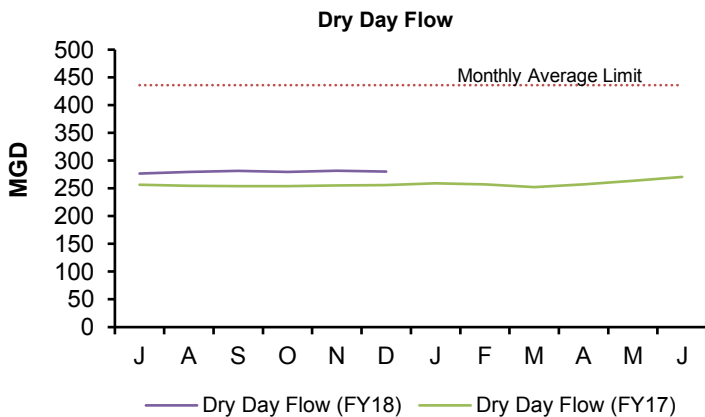
Effluent Characteristics		Units	Limits	October	November	December	2nd Quarter Violations	FY18 YTD Violations
Dry Day Flow:		mgd	436	279.9	281.8	280.0	0	0
cBOD:	Monthly Average	mg/L	25	6.2	5.9	8.2	0	0
	Weekly Average	mg/L	40	7.3	7.0	9.5	0	0
TSS:	Monthly Average	mg/L	30	8.2	8.1	10.3	0	0
	Weekly Average	mg/L	45	9.9	11.2	11.3	0	0
TCR:	Monthly Average	ug/L	456	0	0	0	0	0
	Daily Maximum	ug/L	631	0	0	0	0	0
Fecal Coliform:	Daily Geometric Mean	col/100mL	14000	6	6	7	0	0
	Weekly Geometric Mean	col/100mL	14000	12	18	15	0	0
	% of Samples >14000	%	10	0	0	0	0	0
	Consecutive Samples >14000	#	3	0	0	0	0	0
pH:		SU	6.0-9.0	6.5-6.9	6.6-6.9	6.6-6.9	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	100	50	50	0	0

There have been no permit violations in FY18 to date at the Deer Island Treatment Plant (DITP).



Total Suspended Solids (TSS) in the effluent is a measure of the amount of solids that remain suspended after treatment. All TSS measurements for the 2nd Quarter were within permit limits.

Carbonaceous Biochemical Oxygen Demand (cBOD) is a measure of the amount of dissolved oxygen required for the decomposition of organic materials in the environment. All cBOD measurements for the 2nd Quarter



Dry Day Flow is the average of all dry weather influent flows over the previous 365 days. The Dry Day Flow for the 2nd Quarter was well below the permit limit of 436 MGD.

Fecal Coliform is an indicator for the possible presence of pathogens. The levels of these bacteria after disinfection show how effectively the plant is inactivating many forms of disease-causing microorganisms. In the 2nd Quarter, all permit conditions for fecal coliform were met.

## NPDES Permit Compliance: Clinton Wastewater Treatment Plant 2nd Quarter - FY18

### NPDES Permit Limits

Effluent Characteristics		Units	Limits	October	November	December	2nd Quarter Violations	FY18 YTD Violations
Flow:		mgd	3.01	2.44	2.50	2.50	0	0
BOD:	Monthly Average:	mg/L	20	2.5	2.3	2.0	0	0
	Weekly Average:	mg/L	20	3.4	2.8	3.1	0	0
TSS:	Monthly Average:	mg/L	20	3.9	2.7	7.6	0	0
	Weekly Average:	mg/L	20	4.7	4.4	9.7	0	0
pH:		SU	6.5-8.3	7.1-7.7	7.3-7.8	7.0-7.7	0	0
Dissolved Oxygen:		mg/L	6	8.1	9.0	9.5	0	0
E. Coli:	Monthly Geometric Mean:	cfu/100mL	126	5.5	5.1	5.2	0	0
	Daily Geometric Mean:	cfu/100mL	409	26.1	7.1	7.1	0	0
TCR:	Monthly Average:	ug/L	17.6	0.0	0.0	0.0	0	0
	Daily Maximum:	ug/L	30.4	0.0	0.0	0.0	0	0
Copper:	Monthly Average:	ug/L	11.6	8.2	4.3	7.8	0	0
	Daily Maximum:	ug/L	14.0	8.2	4.3	8.6	0	0
Total Ammonia Nitrogen: November 1st - March 31st	Monthly Average:	mg/L	10.0	0.01	0.22	0.02	0	0
	Daily Maximum:	mg/L	35.2	0.12	0.86	0.05	0	0
Total Phosphorus: November 1st - March 31st	Monthly Average:	mg/L	RPT*	0.39	0.65	0.46	0	0
	Daily Maximum:	mg/L	RPT*	0.92	1.10	0.99	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

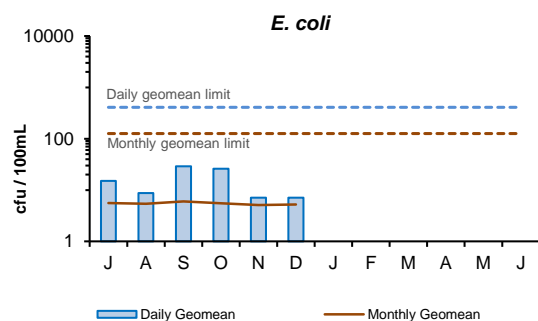
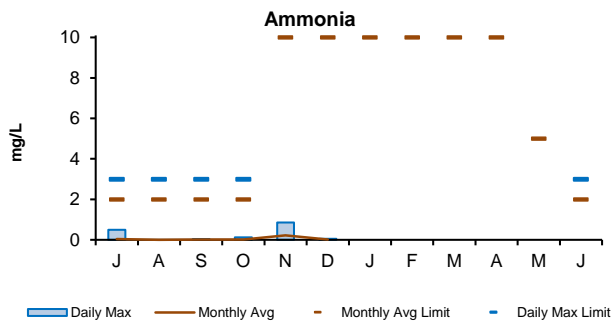
There have been no permit violations in FY18 at the Clinton Treatment Plant.

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

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

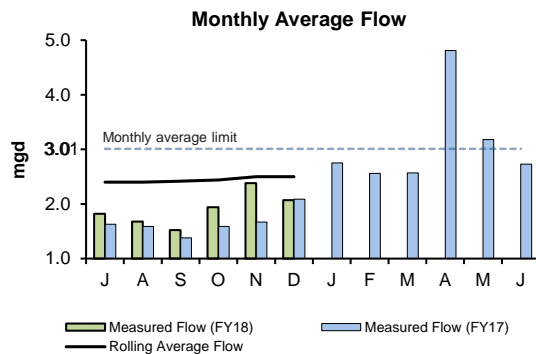
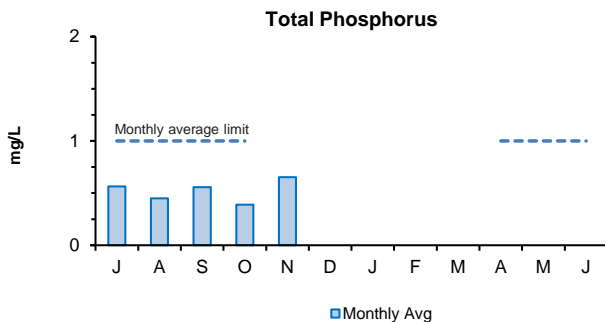
\* The winter period (November 1 - March 31) phosphorus limit of 1.0 mg/L goes into effect November 1, 2019

+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 10.0 mg/L and 35.2 mg/L, respectively. The permit limits are most stringent from June to October when warm weather conditions are most conducive to potential eutrophication.

E. coli is an indicator for the possible presence of pathogens. There were no violations of permit limits in the 2nd Quarter. The monthly and daily limits are 126 cfu/100 mL and 409 cfu/100 mL respectively.



The 2nd Quarter's monthly average concentrations for total phosphorus were below permit limits. The interim permit limit of 1.0 mg/L is in effect from April through October, until April 1st, 2019, when the new permit limit of 0.15 mg/L goes into effect.

The graph depicts the running annual average monthly flow, measured in million gallons per day, exiting the plant. The average monthly flows during the 2nd Quarter were below the NPDES permit limit.

# COMMUNITY FLOWS AND PROGRAMS

# Total Water Use

## MWRA Core Customers

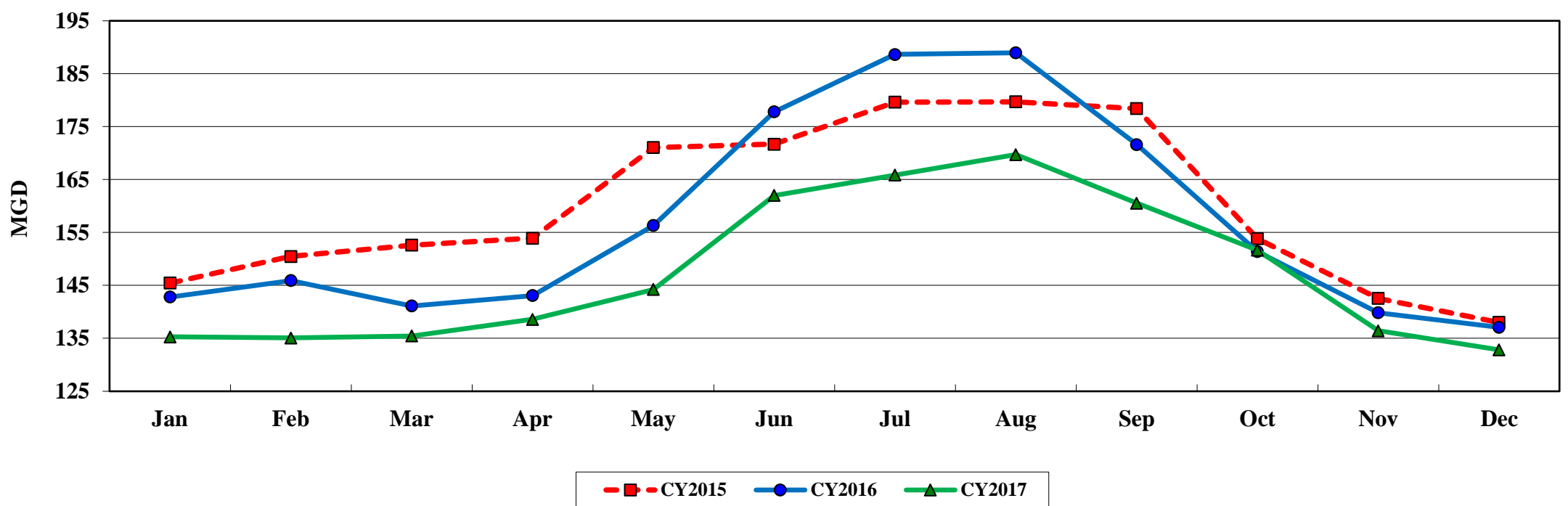
### 2nd Quarter - FY18

\* Receives 100% MWRA Water Service

MGD	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD Average	Average
CY2015	145.466	150.488	152.603	153.932	171.068	171.693	179.652	179.689	178.407	153.846	142.547	138.005	159.839	159.839
CY2016	142.802	145.930	141.117	143.104	156.336	177.803	188.652	188.959	171.633	151.405	139.847	137.094	157.106	157.106
CY2017	135.271	135.087	135.461	138.599	144.254	162.005	165.861	169.729	160.540	151.650	136.428	132.835	147.388	147.388

MG	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD Total	Total
CY2015	4,509.447	4,213.655	4,730.692	4,617.960	5,303.114	5,150.793	5,569.210	5,570.350	5,352.198	4,769.225	4,276.398	4,278.141	58,341.183	58,341.183
CY2016	4,426.874	4,231.969	4,374.642	4,293.123	4,846.430	5,334.082	5,848.205	5,857.743	5,148.989	4,693.548	4,195.395	4,249.903	57,500.901	57,500.901
CY2017	4,193.408	3,782.445	4,199.290	4,157.976	4,471.868	4,860.149	5,141.705	5,261.585	4,816.189	4,701.154	4,092.845	4,117.878	53,796.492	53,796.492

**Total Water Use: MWRA Core Communities**  
 Arlington, Belmont, BWSC, Brookline, Chelsea, Everett, Framingham, Lexington, Malden, Medford, Melrose, Milton, Newton, Norwood, Quincy, Reading, Revere, Somerville, Stoneham, Waltham, Watertown, Winthrop



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

December 2017 water supplied of 161.4 mgd (for revenue generating users) is down 4.7 mgd or 2.8% compared to December 2016. System-wide annual consumption for CY17 was significantly lower than CY16 with 183.1 mgd being supplied to MWRA customers. This is 17.4 mgd lower than CY16, and is a decrease of 8.7%.

Record low water use by MWRA customers occurred in seven of the twelve months in CY17, with December usage of 161.4 mgd representing the lowest monthly usage in the history of MWRA.

# Community Wastewater Flows

2nd Quarter - FY18

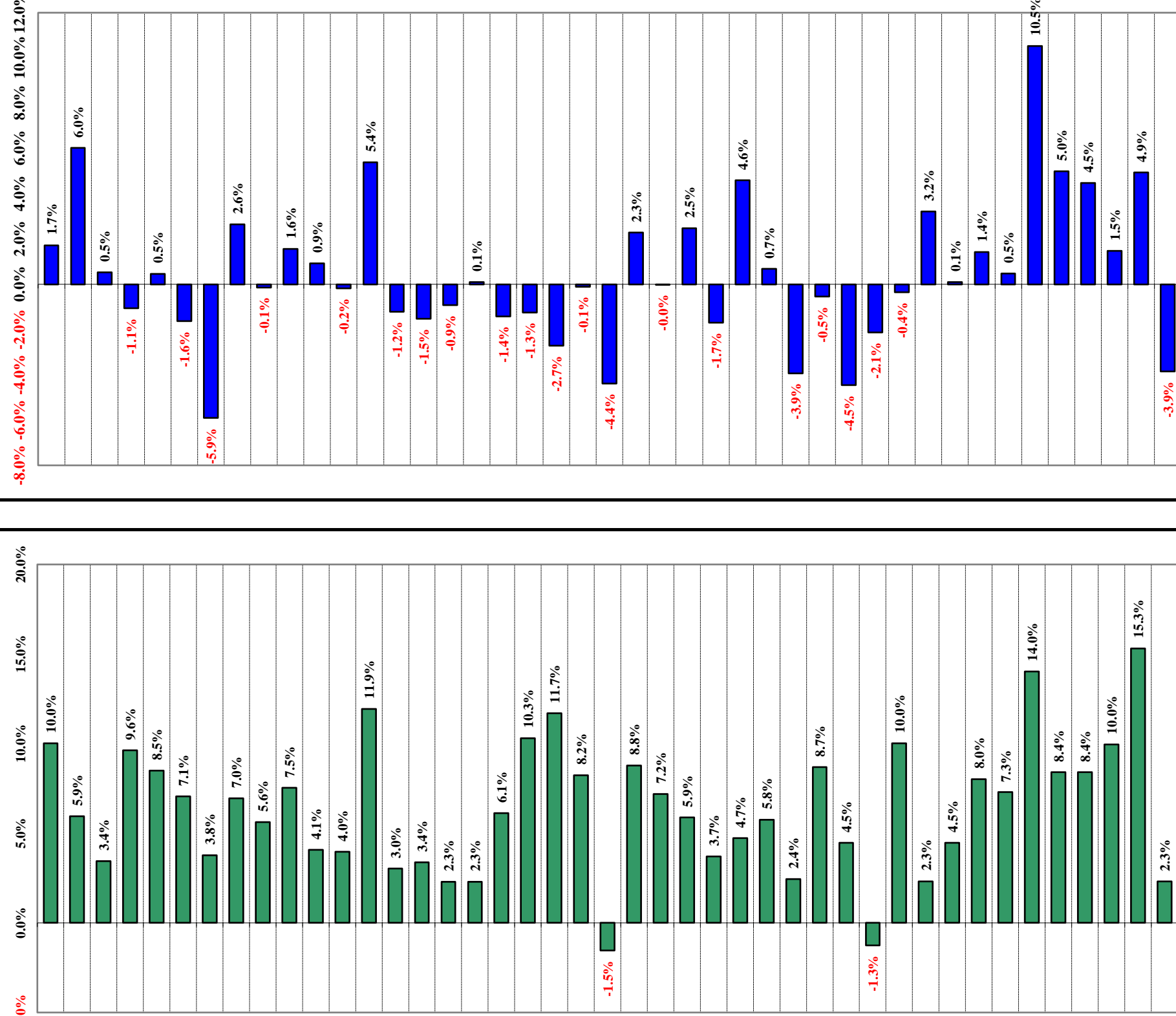
## How Projected CY2017 Community Wastewater Flows Could Effect FY2019 Sewer Assessments <sup>1,2,3</sup>

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

**Change in Average Flow**

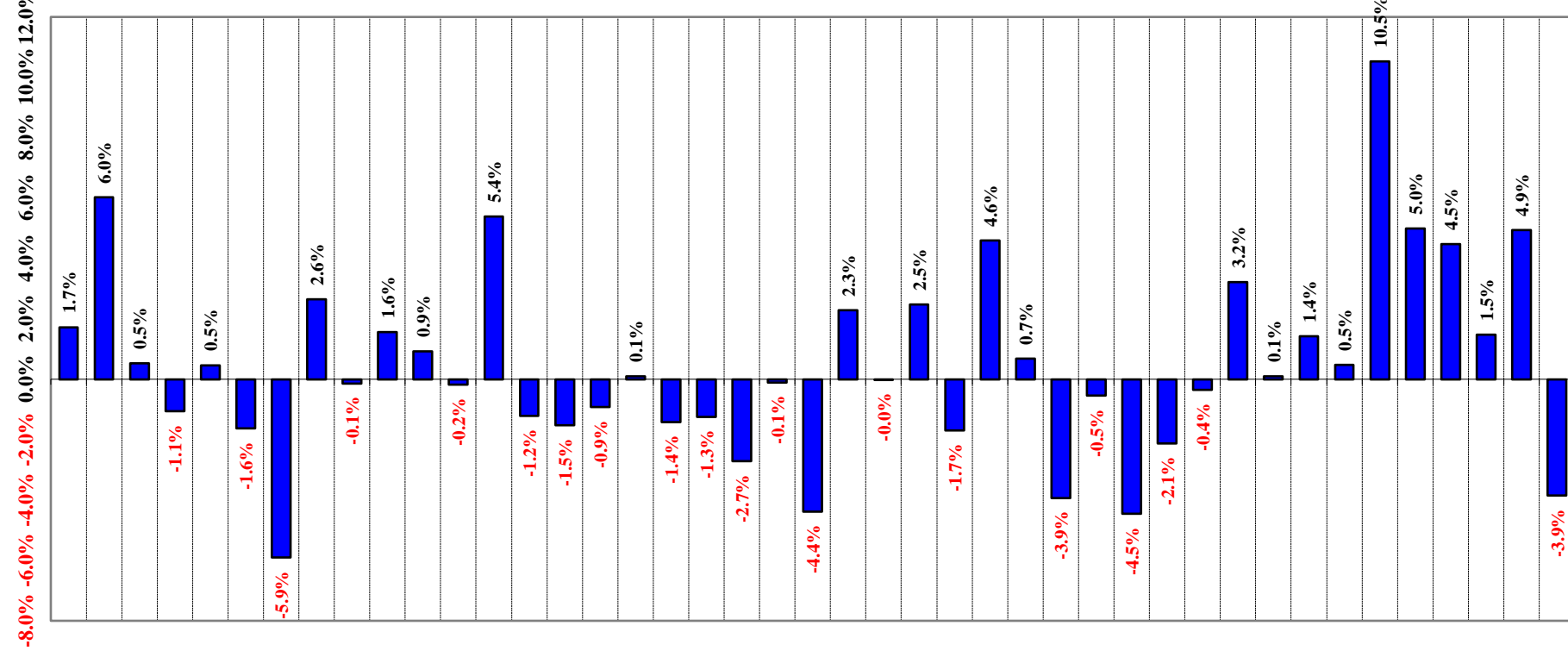


**Change in Max. Month Flow**

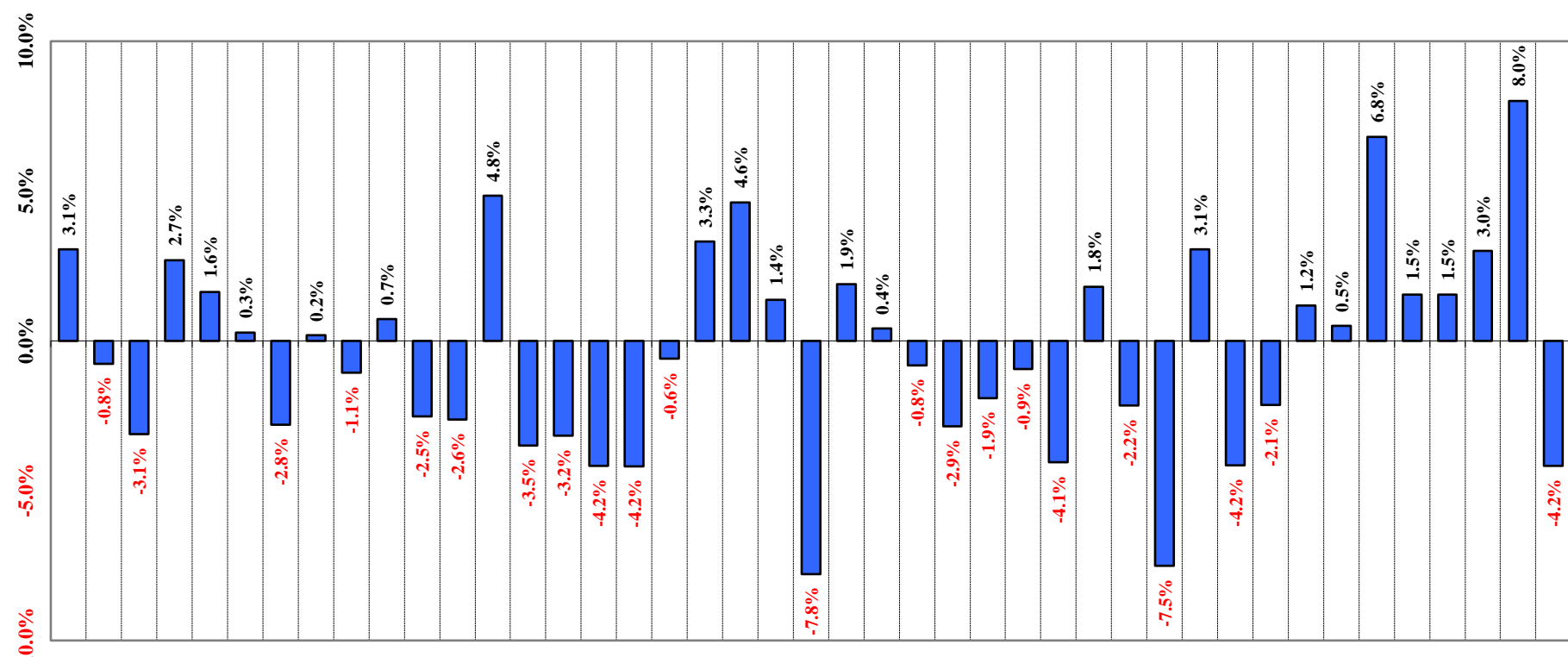


But as MWRA's sewer assessments are a ZERO-SUM calculation, a community's assessment is strongly influenced by the RELATIVE change in CY2015 to CY2017 flow share compared to CY2014 to CY2016 flow share, compared to all other communities in the system.

**Change in Average Flow Share**

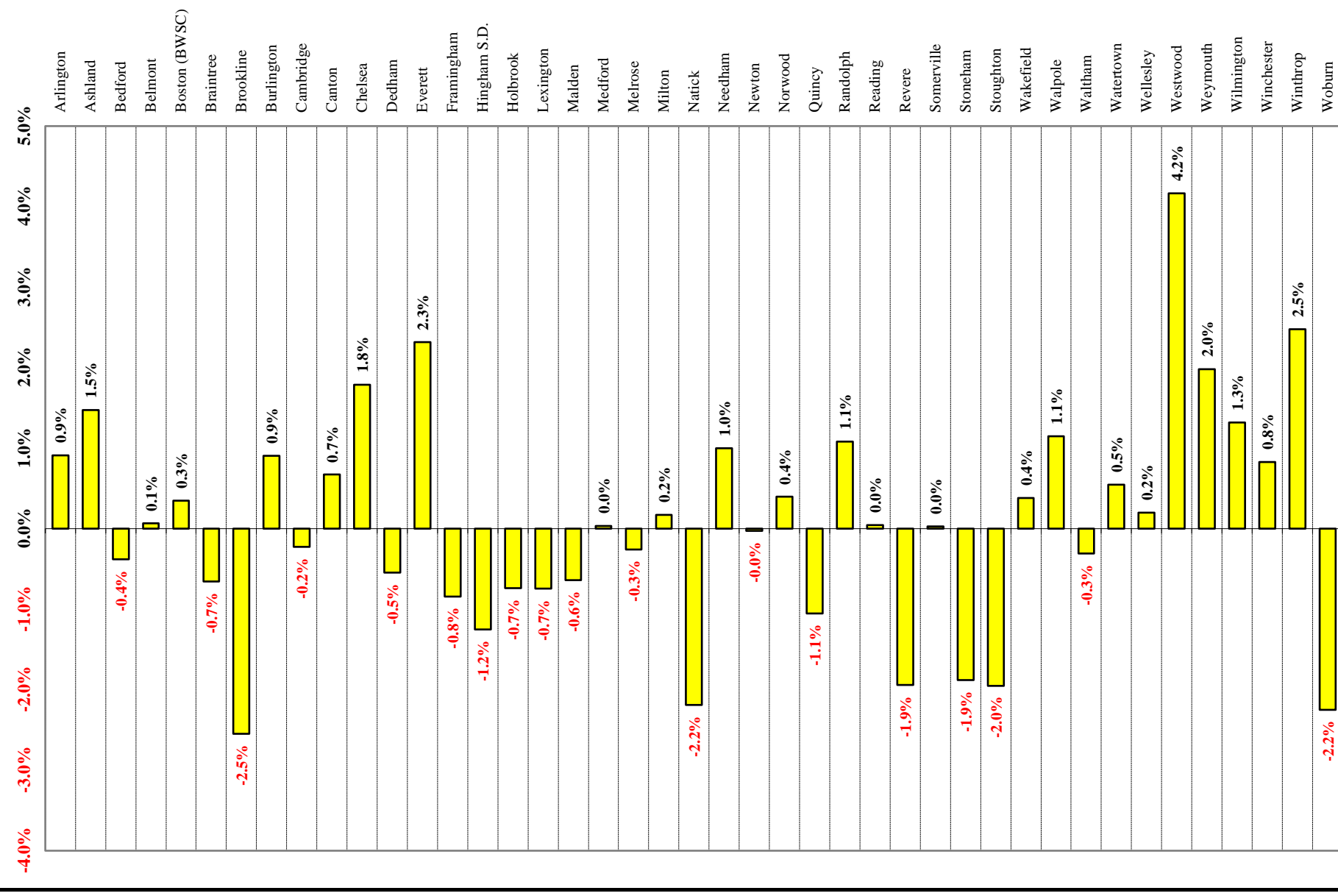


**Change in Max Month Flow Share**



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

**Assessment Impact Due to Change in Flow Share**



**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 CY2014 to CY2017 average wastewater flows as of 02/07/18. Flow data is preliminary and subject to change pending additional MWRA and community review.

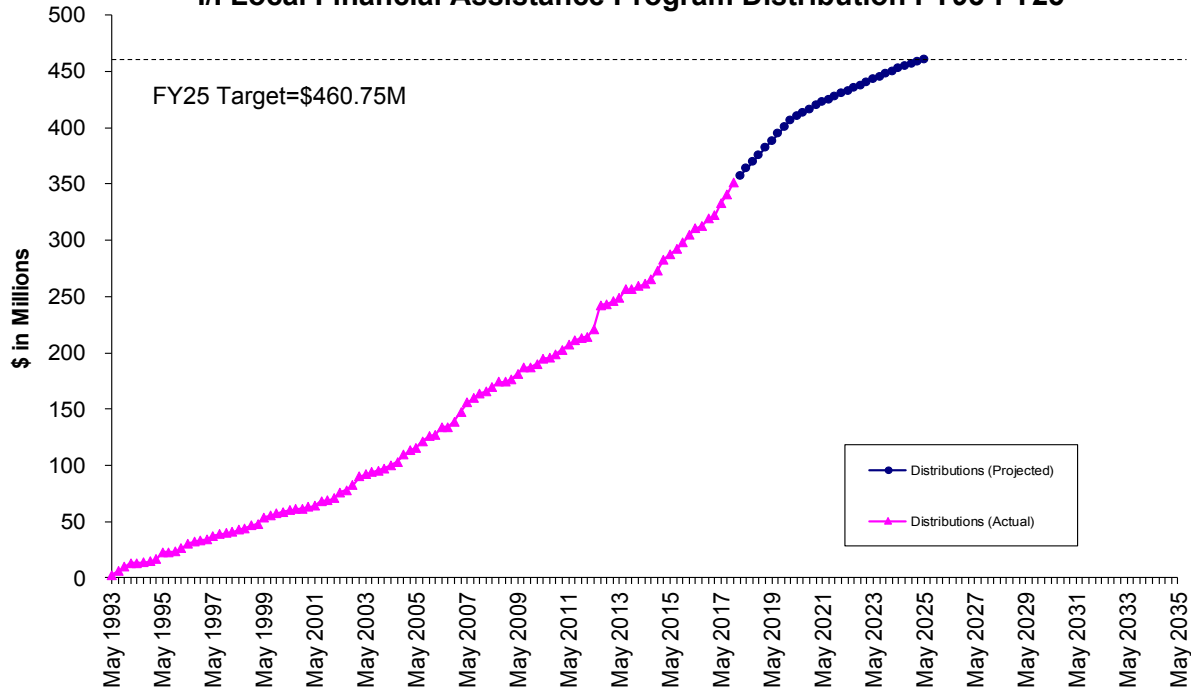
# Community Support Programs

2<sup>nd</sup> Quarter – FY18

## Infiltration/Inflow Local Financial Assistance Program

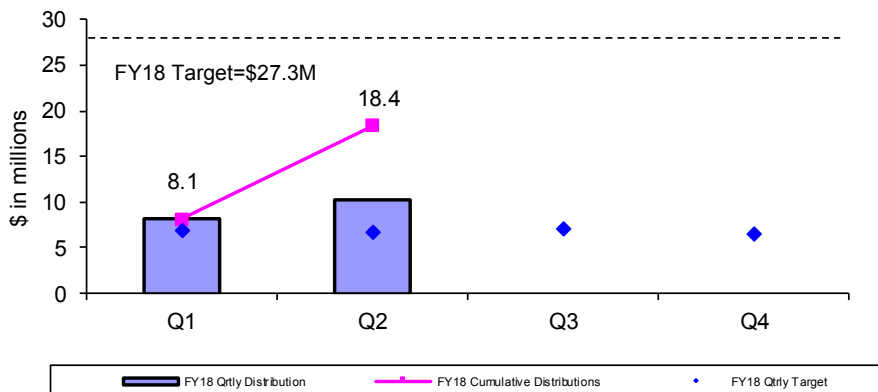
MWRA's Infiltration/Inflow (I/I) Local Financial Assistance Program provides \$460.75 million in grants and interest-free loans (average of about \$14 million per year from FY93 through FY25) to member sewer communities to perform I/I reduction and sewer system rehabilitation projects within their locally-owned 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 FY18, \$10.3 million in financial assistance (grants and interest-free loans) was distributed to fund local sewer rehabilitation projects in Braintree, Cambridge, Melrose, Weymouth and Woburn. Total grant/loan distribution for FY18 is \$18.4 million. From FY93 through the 2<sup>nd</sup> Quarter of FY18, all 43 member sewer communities have participated in the program and more than \$351 million has been distributed to fund 538 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.

### FY18 Quarterly Distributions of Sewer Grant/Loans

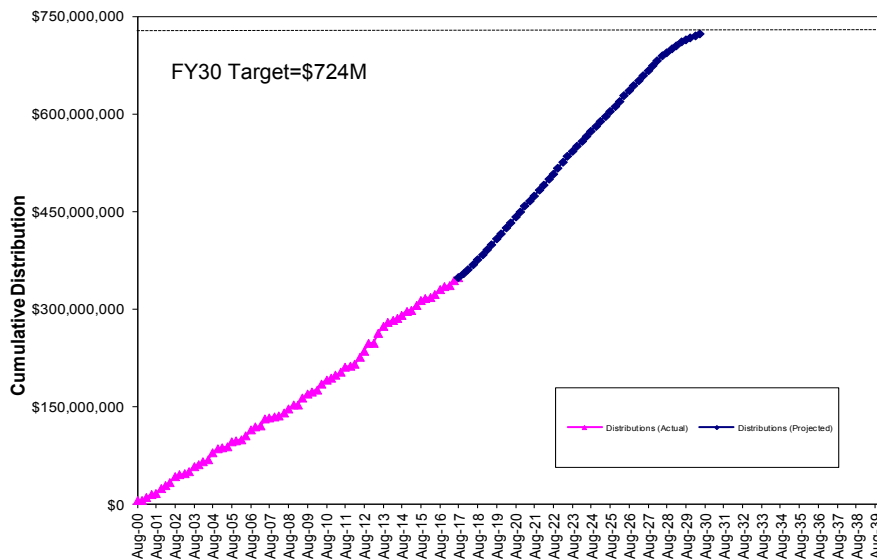


# Community Support Programs 2<sup>nd</sup> Quarter – FY18

## Local Water System Assistance Program

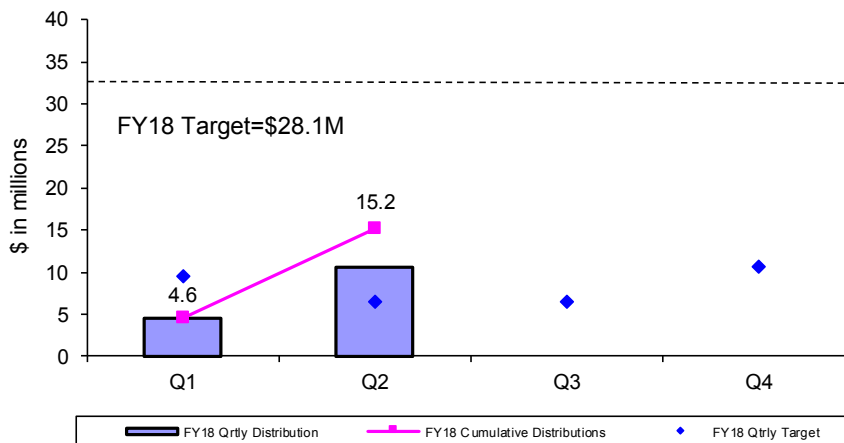
MWRA’s Local Water System Assistance Programs (LWSAP) provides \$724 million in interest-free loans (an average of about \$24 million per year from FY01 through FY30) to member water communities to perform water main rehabilitation projects within their locally-owned water distribution systems. There have been 3 phases: Phase 1 at \$222 Million, Phase 2 at \$210 Million, and Phase 3 at \$292 Million. 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 FY23. The Phase 3 Water Loan Program is authorized for distributions FY18 through FY30.

### Local Water System Assistance Program Distribution FY01-FY30



During the 2<sup>nd</sup> Quarter of FY18, \$10.6 million in interest-free loans was distributed to fund local water projects in Boston, Everett, Newton, Saugus, South Hadley F.D. #1, and Winthrop. Total loan distribution for FY18 is \$15.2 million. From FY01 through the 2<sup>nd</sup> Quarter of FY18, more than \$360 million has been distributed to fund 397 local water system rehabilitation projects in 41 MWRA member water communities. Distribution of the remaining funds has been approved through FY30 and community loan repayments will be made through FY40. All scheduled community loan repayments have been made.

### FY18 Quarterly Distributions of Water Loans



# Community Support Programs

2<sup>nd</sup> Quarter – FY18

## 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.

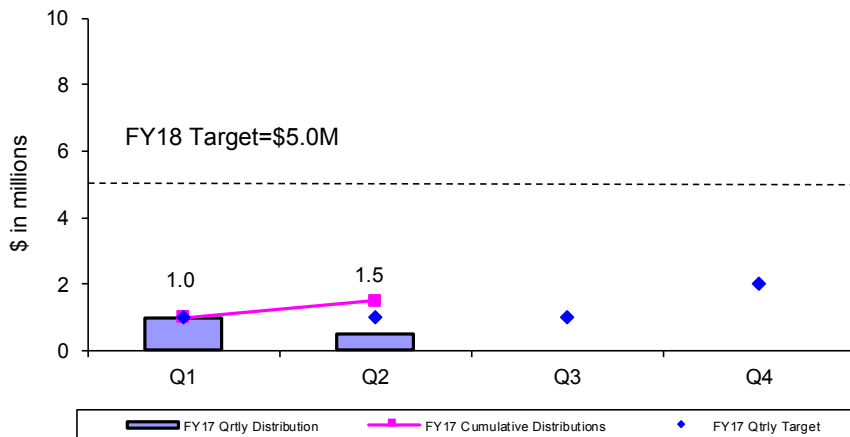
FY17 was the first year of the Lead Service Line Replacement Loan Program. During FY17, MWRA made three Lead Loan Program distributions to Newton for \$4.0 Million, Quincy for \$1.5 Million, and Winchester for \$0.5 Million.

FY18 is the second year of the Lead Loan Program. During the 2<sup>nd</sup> Quarter of FY18, two Lead Loan Program distributions were made to Revere for \$0.2 Million and Winthrop for \$0.3 Million.

Summary of Lead Loans:

Revere in FY18	\$0.2 Million
Winthrop in FY18	\$0.3 Million
Marlborough in FY18	\$1.0 Million
Newton in FY17	\$4.0 Million
Quincy in FY17	\$1.5 Million
<u>Winchester in FY17</u>	<u>\$0.5 Million</u>
TOTAL	\$7.5 Million

## FY18 Quarterly Distributions of Lead Service Line Replacement Loans



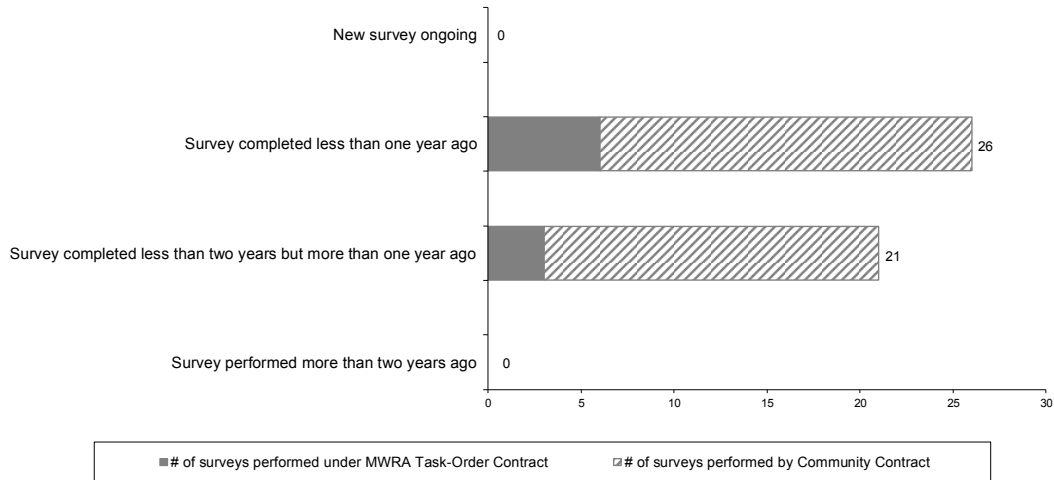


## Community Support Programs

2<sup>nd</sup> Quarter – FY18

### 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 1<sup>st</sup> Quarter of FY18, 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	1,770	20,496			22,266
Low-Flow Fixtures (showerheads and faucet aerators)	10,000	2,018	1,346			3,364
Toilet Leak Detection Dye Tablets	-----	6,126	1,337			7,463

## BUSINESS SERVICES

# Procurement: Purchasing and Contracts

## 2nd Quarter - FY18

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

**Outcome:** Processed 92% of purchase orders within target; Average Processing Time was 4.77 days vs. 4.97 days in Qtr 2 of FY17. Processed 69% (9 of 13) contracts within target timeframe; Average Processing Time was 153 days vs. 122 days in Qtr 2 FY17.

### Purchasing



	No.	TARGET	PERCENT IN TARGET
\$0 - \$500	709	3 DAYS	88.3%
\$500 - \$2K	721	7 DAYS	95.6%
\$2K - \$5K	417	10 DAYS	95.2%
\$5K - \$10K	50	25 DAYS	84.0%
\$10K - \$25K	47	30 DAYS	78.7%
\$25K - \$50K	15	60 DAYS	66.6%
Over \$50K	18	90 DAYS	83.3%

The Purchasing Unit processed 1977 purchase orders, 86 less than the 2063 processed in Qtr 2 of FY17 for a total value of \$8,548,562 versus a dollar value of \$14,165,441 in Qtr 2 of FY17.

The purchase order processing target was not met for the \$5K-\$10K category due to end user approvals; the \$10K- \$25K category due to item clarification and end user approvals; the \$25K-\$50K category due to end user approvals and staff summary requirements; and the over \$50K category due to staff summary requirements.

### Contracts, Change Orders and Amendments

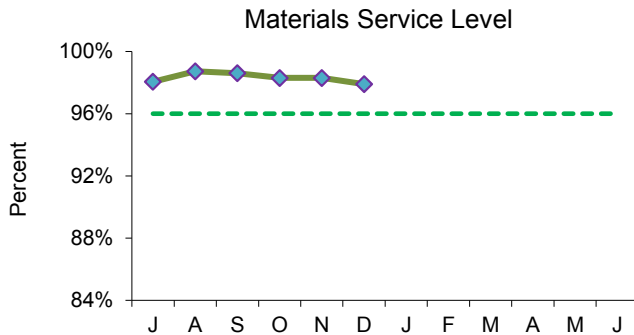
Four contracts were not processed within the target timeframes. Two contracts were not processed within the target timeframes due to additional procurement requirements (Insurance Program Renewal FY18) necessary for insurance services. Insurance for all categories of coverage was obtained timely and according to schedule. Another contract was delayed as a result of staff prioritization of assignments. The final contract was delayed due to staff prioritization of assignments and delays by the contractor in providing insurance certificates.

Procurement processed thirteen contracts with a value of \$5,138,596 and eight amendments with a value of \$904,067. Thirty four change orders were executed during the period. The dollar value of all non-credit change orders during Q2 FY18 was \$2,617,724 and the value of credit change orders was (\$1,410,174).

Staff reviewed 59 proposed change orders and 30 draft change orders.

# Materials Management

2nd Quarter - FY18



The service level is the percentage of stock requests filled. The goal is to maintain a service level of 96%. Staff issued 8,235 (97.9%) of the 8,388 items requested in Q2 from the inventory locations for a total dollar value of \$1,031,318.

## 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 FY18 goal is to reduce consumable inventory from the July '17 base level (\$8.29 million) by 2.0% (approximately \$165,849), to \$8.12 million by June 30, 2018 (see chart below).

Items added to inventory this quarter include:

- Deer Island – adapter set, power supplies, tubing cutter wheel, nylon rope and relays for HVAC; conduit cutter blades, light fixtures, shielded cable and sync panel meters for Electrical Shop; wire, hydraulic pump, couplings, fittings, gas probes and gas filters for I&C; motors and flanged valves for Power & Pump.
- Chelsea – pin shears, skates, blade scrapers, battery cables and battery guards for Fleet Services; chopper pump, operating levels, belts and sealing bands for Work Coordination; iphone cases, holsters, chargers and cables for MIS; casters and gaskets for FOD.
- Southboro – toner cartridges for Administration, shovels, squeegees, ratchet straps, manhole frames and covers, whip heads and brush blades for B&G; spring nuts, abrasive wheels and band saw blades for Equipment Maintenance.

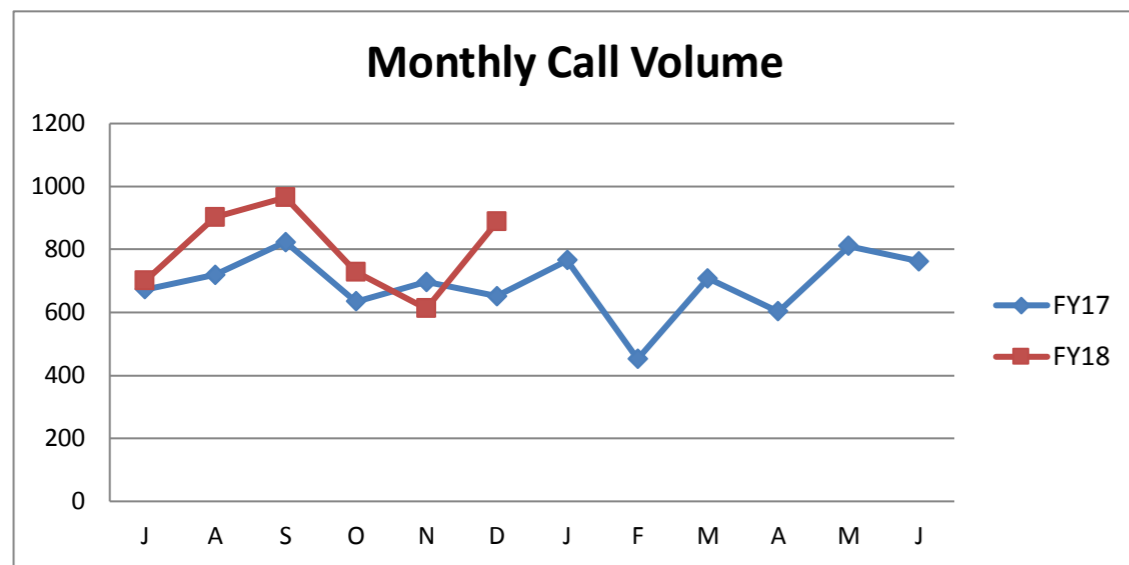
Property Pass Program:

- Four audits were conducted during Q2.
- Scrap revenue received for Q2 amounted to \$18,934. Year to date revenue received amounted to \$30,125.
- Revenue received from online auctions held during Q2 amounted to \$70,145. Year to date revenue received amounted to \$128,535.

Items	Base Value July-17	Current Value w/o Cumulative New Adds	Reduction / Increase To Base
Consumable Inventory Value	8,292,452	8,563,909	271,457
Spare Parts Inventory Value	8,939,710	8,995,072	55,362
Total Inventory Value	17,232,162	17,558,081	325,919

**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.

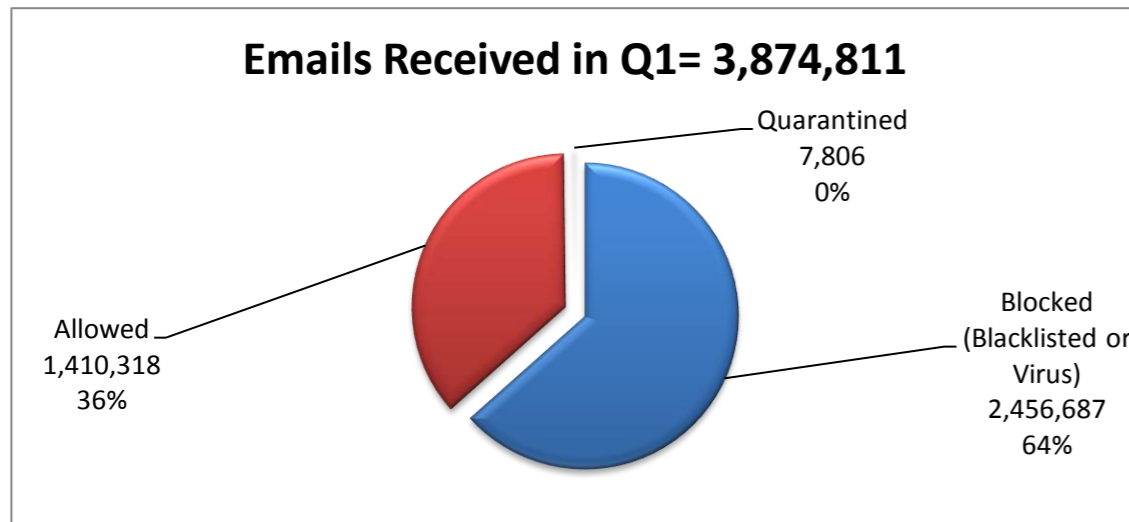
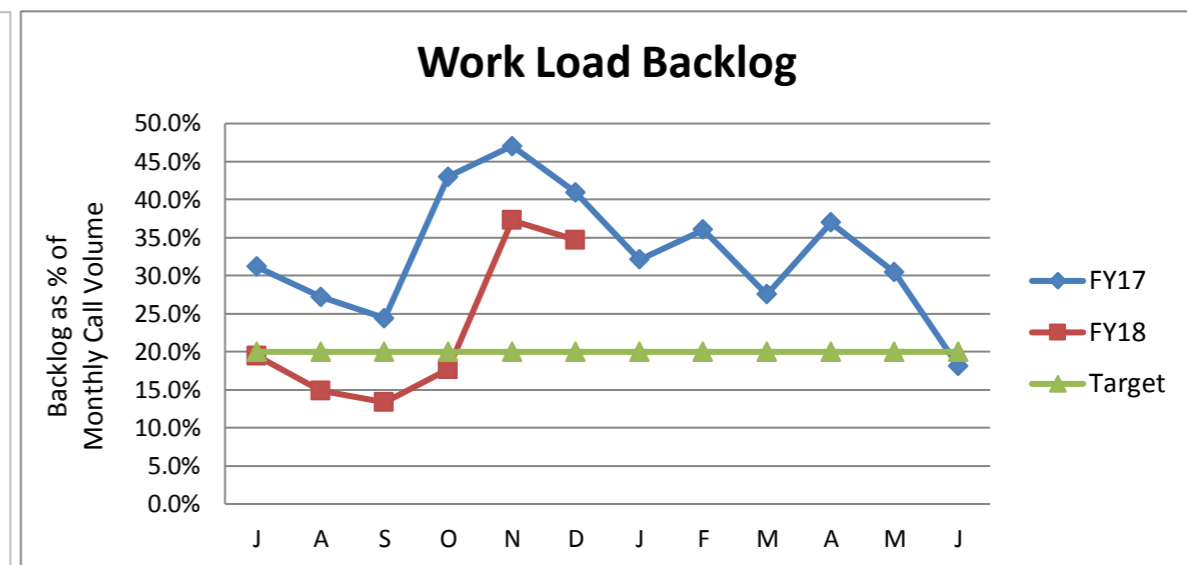
## MIS Program 2nd Quarter - FY18



### Performance & Backlog

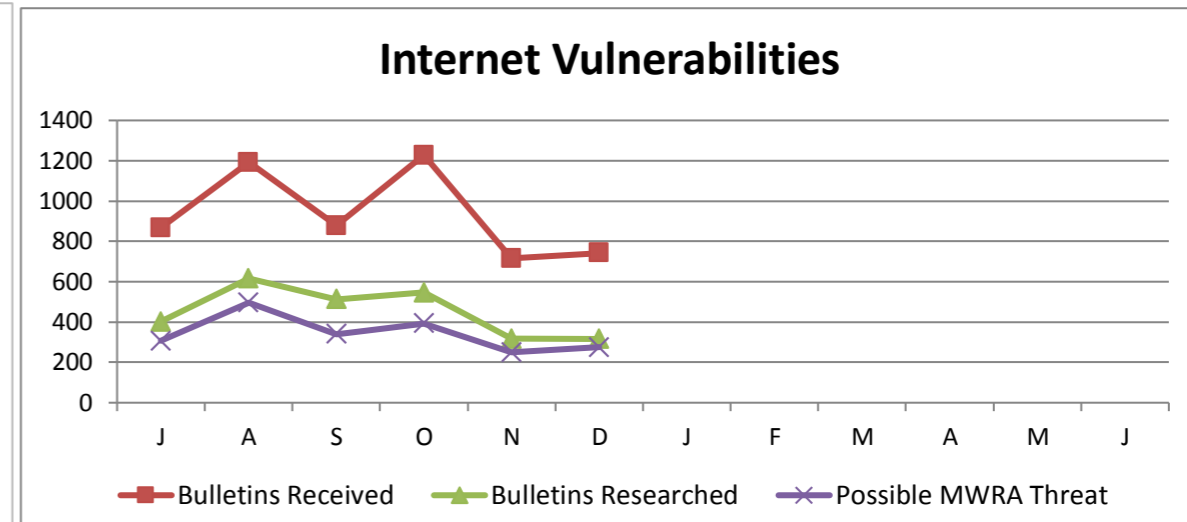
**Call Volume:** Peaked in December. FY18-Q2 call volume increased by 12% from FY17-Q2.

**Call Backlog:** Peaked in December. FY18-Q2 backlog average is 10% above targeted benchmark



### Information Security

In Q2, pushed security fixes/updates to desktops/servers protecting against 149 vulnerabilities. Landesk Antivirus quarantined 44 distinct viruses from 47 PCs. PCs are current with antivirus signatures for



### Infrastructure:

**Office 2016 Upgrade:** 98% of staff PCs have been upgraded. Continued supporting the testing of MS Access databases. Gathered requirements for SCADA alarm reports, generated from two MS Access 2007 databases, so they can be converted to Office 2016. Documented current business practices for 8m permits and Digsafe databases in order to determine how to replace current legacy MS Access databases.

**Server Virtualization:** New hardware implemented in CNY. Two servers migrated; balance to be completed in January.

**Server Backup Solution Replacement:** Hardware and software implemented. Performing system tuning with vendor.

**McAfee Desktop Antivirus Migration:** 98% of desktops, laptops and windows tablets migrated to McAfee antivirus.

**Information Security Program:** 64% of staff has completed the 2017 Security Awareness training; all staff must complete the training by March 2018.

### Applications/Library & Records Center/Training:

**Enterprise Content Management (ECM)/e-Construction:** Created work process diagrams on how the ORION application handles the Request for Information (RFI) and submittals. Proctored a meeting with key team members so they could view 16 instructional OpenText Videos specific to Engineering. Made the videos available internally so that the team could access them as often as needed.

**Strategic Sourcing/Contracts Management:** The first Chapter 149 Construction event with sub bids went live on the portal. When the sub bid event closed, the associated general contractor event opened and is now pending award. A second Chapter 149 Construction event with subs is expected to be posted soon.

**Water Conservation Fixtures Web Order Form:** Participated in a kickoff/requirements meeting with users and other MIS attendees. Completed Project Overview and Charter document and Requirements Documents (RD) including screen mock ups for the external and internal user experiences. Completed the User Acceptance Test Plan (UAT) and the first draft of System Design and Architecture document.

**LIMS/Electronic Library Notebook:** Twenty logbooks per Phase I plan went live. Department of Laboratory Services (DLS) is handling electronic solution replacements for approximately 25 additional paper logs that were eliminated from the scope of the ELN project (non-ELN log solutions).

**Portia-Lawson Interface:** User Acceptance Testing is complete. Deployment scheduled in January 2018.

**Maximo Upgrade:** Vendor has finished building new Maximo 7.6 development environment including IBM Control Desk (ICD).

**PIMS:** Successfully generated TRAC annual fees for the amount of \$1,999,766. Kicked off the PIMS-CromERR project. Staff met with EPA to discuss collaboration regarding integration between WebSMR and EPA.

**Telog Upgrade:** User Acceptance completed. Scheduled to go live in January 2018.

**Library & Records Center:** The Library fulfilled 71 research requests and provided 288 periodicals, standards, books, and reports. Research topics included Framingham Reservoir land takings, Shirley Gut shoreline protection, removal of lead in service lines, horizontal drilling - General Edwards Bridge, lead control strategies, Ward Street Pump Station historic photos, flow coefficient for gate valve openings, and groundwater control. The Records Center added 36 boxes (137 YTD), handled 142 (381 YTD) boxes, and added 32 Rock Core boxes and 107 Soil Sample boxes combined from the Wachasett Aqueduct Pump Station and the Northern Intermediate High Pipeline projects. Attended one Records Conservation Board Meeting.

**IT Training:** For the quarter, 26 staff attended 7 classes. 17% of the workforce has attended at least one class year-to-date. New Hands-on Instructor-led Office 2016 training classes and a new Intermediate Word – Formatting class were completed. A job aid for Secure Hub was developed and a Quick Reference Card for Sharefile was updated. Templates used for classes, job-aids, and quick reference cards were updated.

# Legal Matters

## 2nd Quarter - FY18

### PROJECT ASSISTANCE

#### Court and Administrative Orders:

- **Boston Harbor Litigation and CSO:** Reviewed and submitted semi-annual compliance and progress report.

#### Real Estate, Contract, Environmental and Other Support:

- **8(m) Permits:** Reviewed seventy-eight (78) 8(m) permits. Drafted 8(m) permit for use of a portion of Sudbury Aqueduct land in Framingham by the City of Framingham and Amazing Things Arts Center for outdoor community green space and passive recreation. Drafted 8(m) permit for use of Weston Aqueduct land in Arlington by Santini Realty Trust.
- **Direct Connect Permits:** Revised Direct Connect Permit 17-05-175DC related to a 24-inch PVC sanitary sewer connection to MWRA Section 27 @ Sta. 24+15 in Cambridge, MA.
- **Real Property:** Finalized transformer license for Alewife pump station. Recorded Chapter 91 license for Section 111 water project located at Mother's Brook in Dedham. Reviewed MWRA's/Commonwealth's property interests in parcel of land located adjacent to Chelsea Street Bridge in Chelsea. Drafted letter relative to the transfer of MWRA's Commercial Point CSO Chemical Building to MassDOT. Amended license for use of Cleverly Court parcel in Quincy by J.F. White. Finalized license for use of part of MWRA's entrance way to the Fore River Shipyard by Quincy Shipyard, LLC. Reviewed property interests at DITP relative to placement of new HEEC power cable. Drafted letter to DCAMM relative permitting the use of certain Sudbury Aqueduct land in Needham to Babson College and Franklin W. Olin College of Engineering. Reviewed MWRA's/Commonwealth's property interests for land where MWRA's Clinton Road water pipeline is located in Brookline for a Land Court proceeding. Drafted revised Chelsea Creek Headworks electric service license. Reviewed proposed changes to letter of intent between MWRA and March Fourth related to proposed easement swap at Fore River Shipyard. Drafted one (1) one-day license for charitable event at Deer Island.
- **Watershed Acquisitions:** Reviewed Quabbin Watershed Acquisition W-001183 located on West Street in New Salem, MA; Wachusett Watershed Acquisition W-000110 located on Main Street in Boylston, MA; Quabbin Watershed Acquisition W-000022 located on Daniel Shays Highway in New Salem, MA; Wachusett Watershed Acquisition W-001187 located on Coal Kiln Road in Princeton, MA; and Quabbin Watershed Acquisition W-001184 located on Cooleyville Road in New Salem, MA. Reviewed Wachusett Watershed Acquisition, W-001182 located at 4 Garside Drive in West Boylston.
- **Non-Disclosure Agreements:** Assisted SCADA staff with reviews and drafting of non-disclosure agreements concerning instances in which MWRA shares sensitive cyber-security information with potential and actual third-party SCADA consultants (CyberX and Fortinet). Assisted Procurement with confidentiality provisions for John J. Carroll Water Treatment Plant SCADA update project.
- **Bays Eutrophication (BEMS) Procurement:** Drafted letter to UMass Dartmouth seeking concurrence that MWRA's next intended use of software developed under prior MWRA contracts issued to UMass is not a prohibited commercial use.
- **Fore River Railroad Corporation (FRRC):** Drafted and recorded FRRC's notice exercising its option to extend its lease with MWRA. Filed Certificate of Change of Directors or Officers of the FRRC with the Secretary of the Commonwealth.

## LABOR, EMPLOYMENT AND ADMINISTRATIVE

**New Matters** Nine demands for arbitration were filed.

**Matters Concluded** Received an arbitrator's decision in favor of a Union finding that the MWRA did violate a collective bargaining agreement with respect to the job classification of Grievant's position.

### LITIGATION/TRAC

**New Matters** J. D'Amico, Inc. v. MWRA, C.A. No. 1784CV04097-C: MWRA general contractor for the Watertown/Waltham Section contract (No. 7222) filed a complaint against MWRA on December 26, 2017 alleging that: (i) MWRA failed to provide adequate design parameters for the rehabilitation of a water line in violation of G.L. c. 30, and (ii) MWRA breached the contract by requiring the contractor to repair deficiencies in its original work which exceed the original parameters and/or scope of the contract. MWRA intends to file a counterclaim against D'Amico and to add Green Int'l as a third-party defendant in connection with alleged breaches by both parties under their contracts with MWRA.

### Significant Claims

Successfully defended against party defendant's attempt to obtain court approval for issuance of subpoena to non-party MWRA in pending criminal proceeding arising out of deaths caused by unprotected trench excavation incident in Boston (Atlantic Drain) dating back to October 2016.

### Significant Developments

DaPrato v. MWRA, C.A. No. 2015 CV 3687 D: Substituted trial counsel upon withdrawal of prior lead counsel; obtained continuance and assignment of new trial date; concluded billing credit from outside counsel due to withdrawal. Final trial preparation, including drafting of motions *in limine*, jury instructions and causation brief.

Harbor Electric Energy Company: DPU Tariff Addendum Proceeding No. 17-136: Drafted portions of MWRA's discovery requests to HEEC re: contested issues of AFUDC entitlement, and proper method for calculating ADIT tax deferral expense over life of new under-harbor cable. Reviewed HEEC's responses and consulted with outside counsel re: need to add ADIT as a key component of MWRA's opposition to preliminary tariff addendum and potential need for expert opinion re: ADIT reporting.

### Closed Cases

Besnik and Violetta Lalaj MVA Claim: The personal injury auto accident claim of Besnik and Violetta Lalaj was resolved for \$6,500 each, or a total of \$13,000. The Law Division worked on this matter in conjunction with Risk Management. Mr. and Mrs. Lalaj claimed that they sustained injuries resulting allegedly from an automobile accident that involved an MWRA vehicle, on November 10, 2015, in Somerville, Mass. The matter was resolved prior to suit.

### Subpoenas

During the 2nd Quarter of FY 2018, one new subpoena was received and one subpoena was pending at the end of the 2nd Quarter FY 2018.

### Public Records

During the Second Quarter of FY 2018, twenty-three public records requests were received and eighteen public records requests were closed.

## SUMMARY OF PENDING LITIGATION MATTERS

TYPE OF CASE/MATTER	As of Dec 2017	As of Sept 2017	As of June 2017
Construction/Contract/Bid Protest (other than BHP)	1	0	0
Tort/Labor/Employment	2	2	3
Environmental/Regulatory/Other	2	2	2
Eminent Domain/Real Estate	0	0	0
<b>total – all defensive cases</b>	<b>5</b>	<b>4</b>	<b>5</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>7</b>	<b>6</b>	<b>7</b>
Claims not in suit: <u>Joel Chiet Claim</u> <u>Thang Viet Vu and Oanh Vu Claim</u>	2	3	3
Bankruptcy	2	2	3
Wage Garnishment	15	15	15
TRAC/Adjudicatory Appeals	1	1	2
Subpoenas	1	1	1
<b>TOTAL – ALL LITIGATION MATTERS</b>	<b>28</b>	<b>28</b>	<b>31</b>

### TRAC/MISC.

<b>New Appeals:</b>	One new TRAC appeal received. <u>Twin Rivers Technology Manufacturing Corporation: MWRA Docket No. 17-05</u> ; Permittee challenges recent TRAC administrative enforcement order and one prior penalty, and seeks to stay further enforcement process until appeal is concluded.
<b>Settlement by Agreement of Parties</b>	No Settlement by Agreement of Parties.
<b>Stipulation of Dismissal Notice of Dismissal</b>	No Joint Stipulation of Dismissals filed.
<b>Fine paid in full</b>	No cases of Notices of Dismissal, Fine paid in full.
<b>Tentative Decision</b>	One Tentative Decision was issued in the 2nd Quarter FY 2018. <u>Leavitt Corporation; MWRA Docket No. 17-04.</u>
<b>Final Decisions</b>	One Final Decision was issued in the 2nd Quarter FY 2018. <u>Leavitt Corporation; MWRA Docket No. 17-04</u>



## INTERNAL AUDIT AND CONTRACT AUDIT ACTIVITIES

### 2nd Quarter FY18

#### Highlights

During the 2nd Quarter FY18, Internal Audit (IA) issued a report on the Chelsea lease for FY17 including real estate taxes and insurance escrow account balances. A determination will be made in early 2018 if excess monies are being held in the insurance escrow account that should be returned to the MWRA.

IA completed 2 consultant preliminary reports with contract values totaling \$6.8 mill. Final reports on four incurred cost audit was also issued that included CDM Smith, Bryant Associates and Keville Enterprises. Management advisory services included the amendment to the security guard contract, unemployment compensation, Fore River Railroad corporation support, and continuing work on HEEC, both for the old cable and DPU tariff filings related to the proposed new cable.

#### Status of Recommendations

During FY18, a total of 17 recommendations from prior fiscal years' audits were closed.

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

Report Title (issue date)	Audit Recommendations		
	Total	Closed	Open
Unmatched Receipts and Accruals (6/30/15)	10	8	2
Warehouse Cycle Counts at DITP (11/5/15), Southboro (11/6/15) and Chelsea (12/4/15)	25	23	2
MIS Mobile Equipment Asset Tracking (9/26/16)	12	11	1
Wright Express (WEX) Credit Card Fuel Purchases (11/16/16)	13	10	3
Purchase Card Activity on Deer Island (3/31/17)	15	11	4
<b>Total Recommendations</b>	<b>75</b>	<b>63</b>	<b>12</b>

#### Cost Savings

IA's target is to achieve at least \$1,000,000 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 prior years' audits.

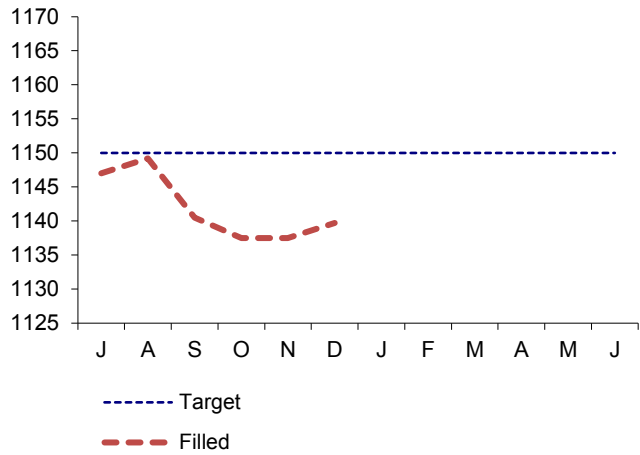
Cost Savings	FY14	FY15	FY16	FY17	FY18 Q2	TOTAL
Consultants	\$294,225	\$87,605	\$88,312	\$272,431	\$77,275	\$819,848
Contractors & Vendors	\$415,931	\$1,146,742	\$1,772,422	\$3,037,712	\$827,459	\$7,200,266
Internal Audits	\$923,370	\$543,471	\$220,929	\$224,178	\$107,330	\$2,019,278
<b>Total</b>	<b>\$1,633,526</b>	<b>\$1,777,818</b>	<b>\$2,081,663</b>	<b>\$3,534,321</b>	<b>\$1,012,064</b>	<b>\$10,039,392</b>

## OTHER MANAGEMENT

# Workforce Management

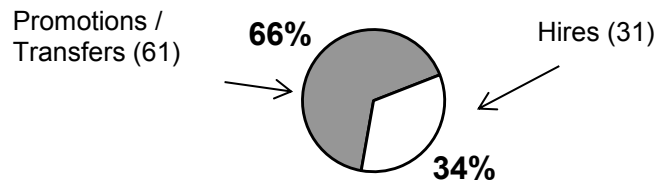
## 2nd Quarter - FY18

**FTE Tracking**



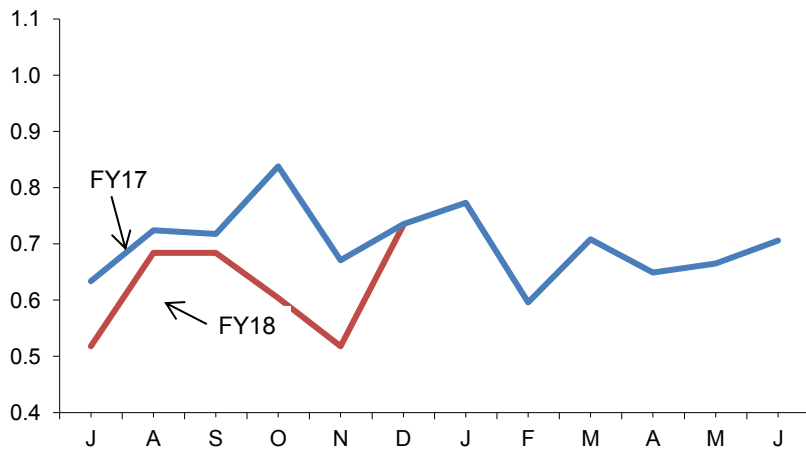
FY18 Target for FTE's = 1150  
 FTE's as of DEC 2017 = 1139.7

**Positions Filled by Hires/Promotions**  
 FY18-YTD



	Pr/Trns	Hires	Total
FY16	99 (62%)	60 (38%)	159
FY17	155 (68%)	72 (32%)	227
FY18	61 (66%)	31 (34%)	92

**Average Monthly Sick Leave Usage**  
 Per Employee

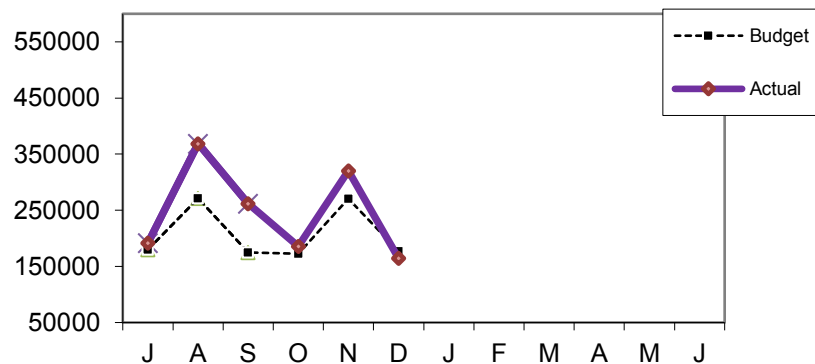


Average monthly sick leave for the 2nd Quarter of FY18 decreased as compared to the 2nd Quarter of FY17 (7.48 to 8.41 days)

	Employees	YTD	Total	FMLA %	FY17
Admin	135	3.05	6.09	20.2%	7.75
Aff. Action	5	4.50	8.99	13.8%	6.28
Executive	5	1.53	3.05	33.4%	13.80
Finance	35	2.93	5.87	0.0%	8.50
Int. Audit	7	2.31	4.62	0.0%	6.51
Law	15	3.27	6.54	6.2%	8.98
OEP	8	1.20	2.39	0.0%	5.74
Operations	932	3.63	7.26	19.0%	8.55
Pub. Affs.	14	5.01	10.01	59.3%	6.31
<b>MWRA Avg</b>	<b>1156</b>	<b>3.74</b>	<b>7.48</b>	<b>19.4%</b>	<b>8.42</b>

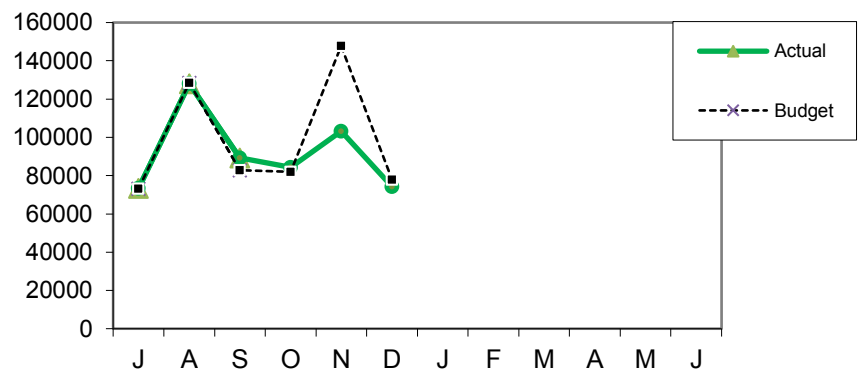
Percent of sick leave usage for FY18, attributable to Family and Medical Leave Act (FMLA) is 19.4% .

**Field Operations**  
 Current Month Overtime \$



Total Overtime for Field Operations for the second quarter of FY2018 was \$670,389 which is \$51k over budget. Emergency overtime was \$256k, which was (\$59k) under budget, the majority of which was for rain events, and emergency maintenance. Coverage overtime was \$140k, which was \$8k over budget, reflecting the month's shift coverage requirements. Planned overtime was \$275k or \$101k over budget, mainly for completing a grounds maintenance project backlog in Western Ops due to low staffing, night leak detection, and Spot Pond tank inspection, and a water main break at the Mass DPW salt yard. YTD, FOD has spent \$1,492,672 on overtime which is \$246k over budget.

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

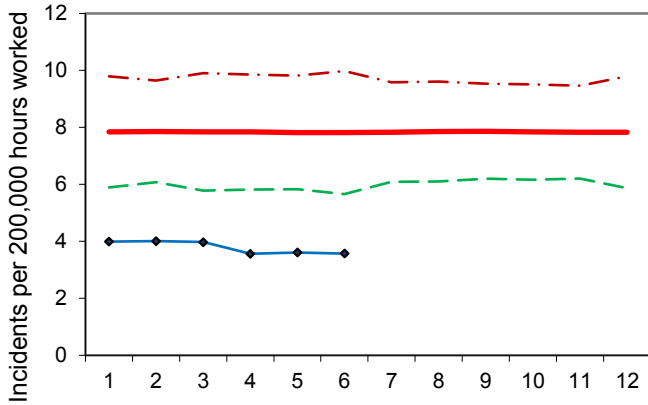


Total Overtime for Deer Island for the second quarter of FY2018 was \$261,932 which is (\$46k) under budget. Storm coverage was (\$39k) under budget due to less than anticipated events and planned/unplanned overtime was a combined (\$23k) under budget. These items are offset in part by greater than anticipated shift coverage requirements, \$16k, due to vacant operator positions and a IA of a second class engineer in Thermal. YTD, Deer Island has spent \$552,536 on overtime which is (\$40k) under budget.

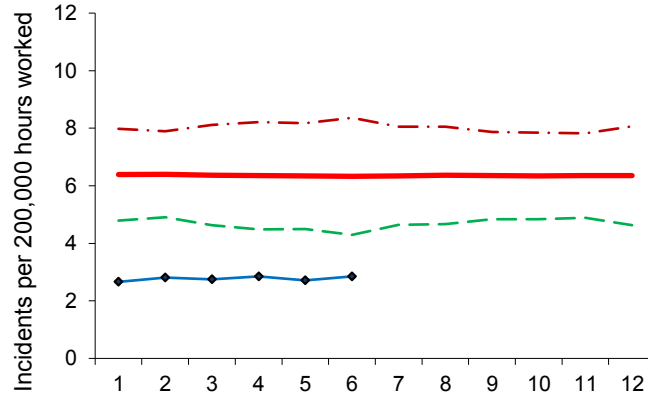
# Workplace Safety

## 2nd Quarter - FY18

**Recordable Injury & Illness Rates**



**Lost Time Injury & Illness Rates**



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

### WORKERS COMPENSATION HIGHLIGHTS

	2nd Quarter Information		Open Claims
	New	Closed	
Lost Time	4	23	60
Medical Only	14	26	15
Report Only	19	19	
	<b>QYTD</b>		<b>FYTD</b>
Regular Duty Returns	6		15
Light Duty Returns	0		2

**COMMENTS:**

**Regular Duty Returns**

- OCT** Four Employee returned to full duty/no restrictions
- NOV** One Employees returned to full duty/no restrictions
- DEC** One Employees returned to full duty/no restrictions

**Light Duty Returns**

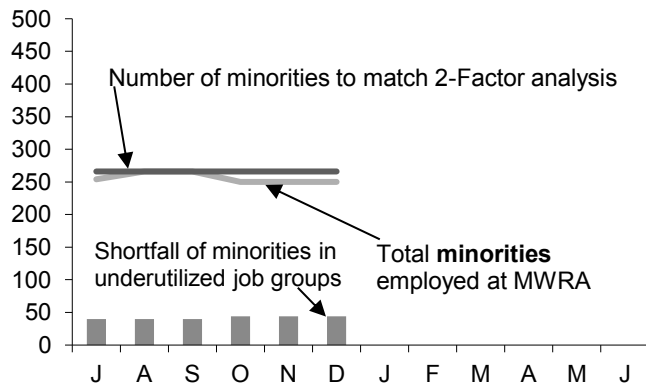
- OCT** N/A
- NOV** N/A
- DEC** N/A

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.

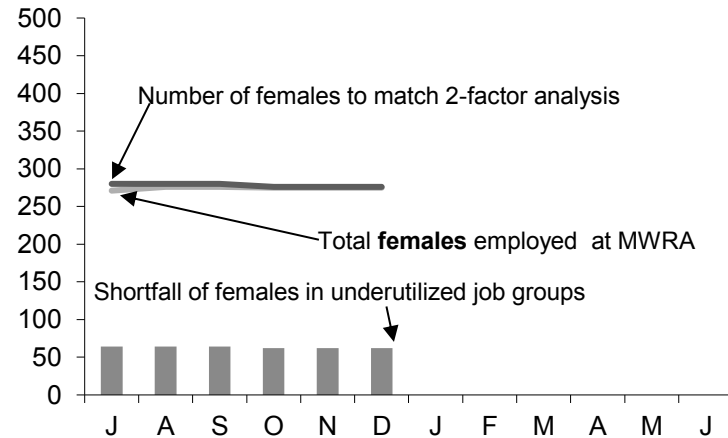
\*Report only claims are closed the month they are filed.

## MWRA Job Group Representation 2nd Quarter - FY18

**Minority - Affirmative Action Plan Goals**



**Female - Affirmative Action Plan Goals**



**Highlights:**

At the end of Q2 FY18, 7 job groups or a total of 44 positions are underutilized by minorities as compared to 4 job groups or a total of 12 positions at the end of Q2 FY17; for females 10 job groups or a total of 62 positions are underutilized females as compared to 9 job groups or a total of 36 positions at the end of Q2 FY17. During Q2, 2 minorities and 4 females were hired. During this same period 5 minorities and 3 females terminated.

### Underutilized Job Groups - Workforce Representation

Job Group	Employees as of 12/31/2017	Minorities as of 12/31/2017	Minority Achievement Level	Over or Under Underutilized	Females As of 12/31/2017	Female Achievement Level	Female Over or Under Underutilized
Administrator A	22	2	2	0	8	6	2
Administrator B	21	1	4	-3	3	4	-1
Clerical A	34	13	10	3	29	15	14
Clerical B	26	9	7	2	9	8	1
Engineer A	79	25	17	8	17	15	2
Engineer B	59	16	14	2	13	7	6
Craft A	113	16	27	-11	1	8	-7
Craft B	145	25	33	-8	3	8	-5
Laborer	64	20	14	6	2	3	-1
Management A	102	15	24	-9	38	40	-2
Management B	45	8	7	1	9	5	4
Operator A	68	4	11	-7	1	3	-2
Operator B	67	15	12	3	4	18	-14
Professional A	33	5	8	-3	21	16	5
Professional B	161	45	42	3	80	53	27
Para Professional	61	19	22	-3	30	53	-23
Technical A	50	11	11	0	6	12	-6
Technical B	6	1	1	0	1	2	-1
<b>Total</b>	<b>1156</b>	<b>250</b>	<b>266</b>	<b>28/-44</b>	<b>275</b>	<b>276</b>	<b>61/-62</b>

### AACU Candidate Referrals for Underutilized Positions

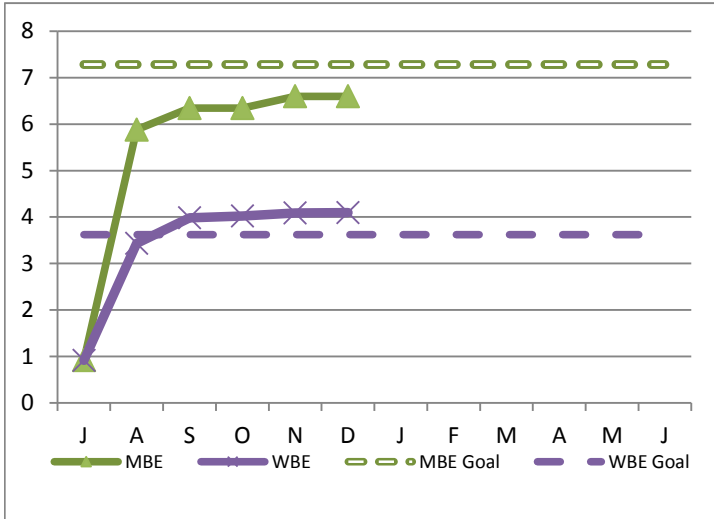
Job Group	Title	# of Vac	Requisition Int. / Ext.	Promotions/ Transfers	AACU Ref. External	Position Status
Craft A	M&O Specialist	2	Int/Ext	Int	0	Promo = WM NH=WM
Craft B	Second Class Engineer	1	Int/Ext	Int	0	Promo = WM
Craft B	Facilities Specialist	1	Int	Ext	0	NH = WM
Craft B	Med Voltage Electrical Specialist	1	Int	Int	0	Promo = WM
Clerical B	Inventory Control Specialist	1	Int/Ext	Int	0	NH= WF
Engineer A	Sr. Engineer	2	Int/Ext	Int/Ext	0	(2) Promo = WM
Engineer A	Sr. Civil Engineer	1	Int	Int	0	Promo = HM
Engineer A	Project Manager, Inspections	1	Int/Ext	Int	0	Promo = WM
Engineer A	Sr. Monitoring & Controls Engineer	1	Int/Ext	Int	0	Promo = AM
Engineer A	Program Manager PICS	1	Int/Ext	Int	0	Promo = WM
Engineer B	Asst. Civil Engineer	1	Int/Ext	Int	0	NH= BF
Laborer	OMC Laborer	4	Int/Ext	Int/Ext	0	Promo = (4) WM
Professional B	Deputy Payroll Manager	1	Int	Int	0	Promo = WF
Technical A	Sr. Field Service Technician	1	Int	Int	0	Promo = BM
Technical A	Senior SCADA Technician	1	Int	Int	0	Promo = AM

## MBE/WBE Expenditures 2nd Quarter - FY18

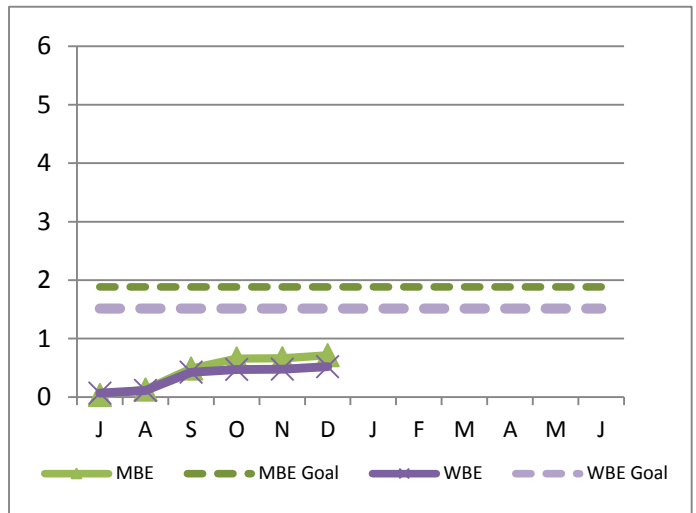
MBE/WBE targets are determined based on annual MWRA expenditure forecasts in the procurement categories noted below. The goals for FY18 are based on 85% of the total construction and 75% of the total professional projected spending for the year. Certain projects have been excluded from the goals as they 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 September.

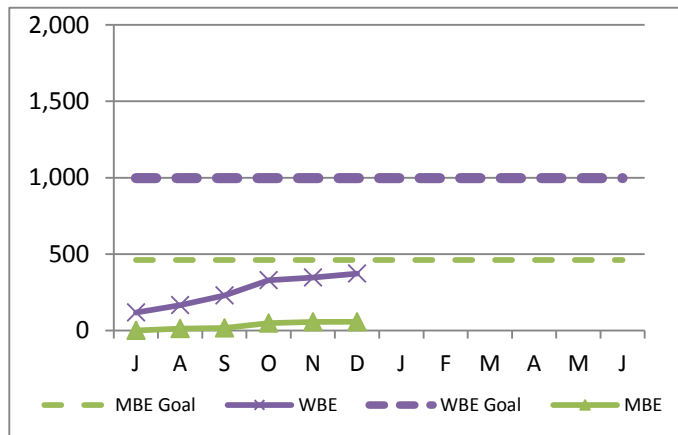
### Construction



### Professional Services



### Goods/Services



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

MBE			
FY18 YTD		FY17	
Amount	Percent	Amount	Percent
6,597,586	90.6%	5,628,738	99.5%
714,349	37.9%	920,597	162.8%
57,265	12.4%	179,359	29.8%
<b>7,369,200</b>	<b>76.5%</b>	<b>6,728,694</b>	<b>98.6%</b>

WBE			
FY18 YTD		FY17	
Amount	Percent	Amount	Percent
4,095,933	113.1%	3,690,334	131.3%
520,059	34.3%	533,917	117.5%
372,266	37.3%	1,553,214	181.6%
<b>4,988,258</b>	<b>81.3%</b>	<b>5,777,465</b>	<b>140.2%</b>

Construction  
Prof Svcs  
Goods/Svcs  
**Totals**

FY17 MBE/WBE dollar totals do not include MBE and WBE payments to prime contractors and consultants.

FY18 MBE/WBE dollar totals include F17 MBE/WBE dollars submitted in FY18.

## MWRA FY18 CEB Expenses 2<sup>nd</sup> Quarter – FY18

As of December 2017, total expenses are \$342.3 million, \$8.4 million or 2.4% lower than budget, and total revenue is \$377.8 million, \$5.3 million or 1.4% over budget, for a net variance of \$13.7 million.

### Expenses –

**Direct Expenses** are \$105.5 million, \$3.9 million or 3.6% below budget.

- **Wages & Salaries** are under budget by \$1.4 million or 3.0%. Regular pay is \$1.4 million under budget, due in part to lower head count. At the end of December, the average Full Time Equivalent (FTE) positions were 1,143, seven fewer than the 1,150 FTE's budgeted.
- **Maintenance** expenses are \$1.2 million or 7.4% under budget due mostly to timing of projects such as the HVAC upgrades at the Braintree/Weymouth Pump Station and door replacements at Deer Island.
- **Worker's Compensation** expenses are \$715k or 61.6% under budget, primarily due to settlement of six claims and resolution of a few other claims through return to work resulting in compensation reserves adjustments and lower medical payments.
- **Chemicals** are \$356k or 6.8% under budget due to lower flows at the Deer Island Wastewater Treatment Plant and the Carroll Water Treatment Plant and timing of deliveries: Soda Ash by \$232k reflecting lower flows and higher natural pH at CWTP, and Activated Carbon by \$151k due to timing, partially offset by over spending of \$299k for Hydrogen Peroxide due to the lower flows at DI.
- **Professional Services** expenses are \$254k or 7.3% under budget. Legal and other service were \$73k and \$190k under budget, respectively due to timing of services.
- **Fringe Benefits** expenses are \$402k or 4.0% under budget, primarily for lower Health Insurance costs of \$310k due to fewer employees and retirees than budgeted participating in health insurance plans, and the shift from family to individual plans.
- **Other Services** expenses are \$149k or 1.3% over budget primarily due to Sludge Pelletization of \$218k due to higher year to date quantities budgeted and space lease rentals \$110k partially offset by underspending of \$148k for other services.
- **Overtime** expenses are \$174k over budget or 8.5% due to recent wet weather events and off-hours maintenance.

**Indirect Expenses** are \$18.1 million, \$485k under budget or 2.6%. Watershed reimbursement is under budget due lower Watershed Reimbursement of \$285k resulting from a year-end over accrual, lower than budgeted Insurance Claims/Premiums of \$108k, and lower than budgeted HEEC cable O&M of \$80k.

**Debt Service Expenses** totaled \$218.7 million, \$4.0 million under budget due to variable rate debt savings reflecting lower than budgeted interest rates.

### Revenue and Income –

**Total Revenue and Income** is \$377.8 million, \$5.3 million higher than budget, primarily due to a \$4.2 million LIBOR settlement from Barclays Bank PLC. Revenues were also over budget by \$630k for favorable returns on investment income, \$228k for the final payment of a class action lawsuit settlement for derivative agreements, \$128k for revenue attributable to renewable energy credits and energy rebates, and \$163k for disposal of surplus material.

	December 2017 Year-to-Date			
	Period 6 YTD Budget	Period 6 YTD Actual	Period 6 YTD Variance	%
<b>EXPENSES</b>				
WAGES AND SALARIES	\$ 48,402,813	\$ 46,960,283	\$ (1,442,530)	-3.0%
OVERTIME	2,036,351	2,210,406	174,055	8.5%
FRINGE BENEFITS	10,041,770	9,640,189	(401,581)	-4.0%
WORKERS' COMPENSATION	1,161,490	446,098	(715,392)	-61.6%
CHEMICALS	5,218,088	4,861,748	(356,340)	-6.8%
ENERGY AND UTILITIES	9,804,677	9,882,606	77,929	0.8%
MAINTENANCE	15,536,912	14,381,700	(1,155,212)	-7.4%
TRAINING AND MEETINGS	209,260	166,839	(42,421)	-20.3%
PROFESSIONAL SERVICES	3,485,577	3,231,855	(253,722)	-7.3%
OTHER MATERIALS	2,046,004	2,097,237	51,233	2.5%
OTHER SERVICES	11,434,847	11,583,421	148,574	1.3%
<b>TOTAL DIRECT EXPENSES</b>	<b>\$ 109,377,789</b>	<b>\$ 105,462,382</b>	<b>\$ (3,915,406)</b>	<b>-3.6%</b>
INSURANCE	\$ 1,006,726	\$ 898,855	\$ (107,871)	-10.7%
WATERSHED/PILOT	12,582,003	12,296,185	(285,818)	-2.3%
HEEC PAYMENT	478,723	398,308	(80,415)	-16.8%
MITIGATION	798,475	787,445	(11,030)	-1.4%
ADDITIONS TO RESERVES	410,558	410,558	-	0.0%
RETIREMENT FUND	3,277,369	3,277,369	-	0.0%
POST EMPLOYEE BENEFITS	-	-	-	---
<b>TOTAL INDIRECT EXPENSES</b>	<b>\$ 18,553,854</b>	<b>\$ 18,068,720</b>	<b>\$ (485,134)</b>	<b>-2.6%</b>
STATE REVOLVING FUND	\$ 40,318,935	\$ 40,318,935	\$ -	0.0%
SENIOR DEBT	130,530,134	130,530,134	-	0.0%
CORD FUND	-	-	-	---
DEBT SERVICE ASSISTANCE	(391,580)	(391,580)	-	0.0%
CURRENT REVENUE/CAPITAL	6,600,000	6,600,000	-	0.0%
SUBORDINATE MWRA DEBT	42,197,487	42,197,487	-	0.0%
LOCAL WATER PIPELINE CP	1,897,472	1,897,472	-	0.0%
CAPITAL LEASE	1,608,530	1,608,530	-	0.0%
DEBT PREPAYMENT	-	-	-	---
VARIABLE DEBT	-	(4,037,603)	(4,037,603)	---
HEEC CABLE CAPACITY RESERV	-	-	-	---
DEFEASANCE ACCOUNT	-	-	-	---
<b>TOTAL DEBT SERVICE</b>	<b>\$ 222,760,978</b>	<b>\$ 218,723,375</b>	<b>\$ (4,037,603)</b>	<b>-1.8%</b>
<b>TOTAL EXPENSES</b>	<b>\$ 350,692,621</b>	<b>\$ 342,254,477</b>	<b>\$ (8,438,143)</b>	<b>-2.4%</b>
<b>REVENUE &amp; INCOME</b>				
RATE REVENUE	\$ 358,527,000	\$ 358,527,000	\$ -	0.0%
OTHER USER CHARGES	4,381,124	4,352,996	(28,128)	-0.6%
OTHER REVENUE	4,842,029	9,576,987	4,734,958	97.8%
RATE STABILIZATION	-	-	-	---
INVESTMENT INCOME	4,730,371	5,360,507	630,136	13.3%
<b>TOTAL REVENUE &amp; INCOME</b>	<b>\$ 372,480,524</b>	<b>\$ 377,817,490</b>	<b>\$ 5,336,966</b>	<b>1.4%</b>

## Cost of Debt 2<sup>nd</sup> Quarter – FY18

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.

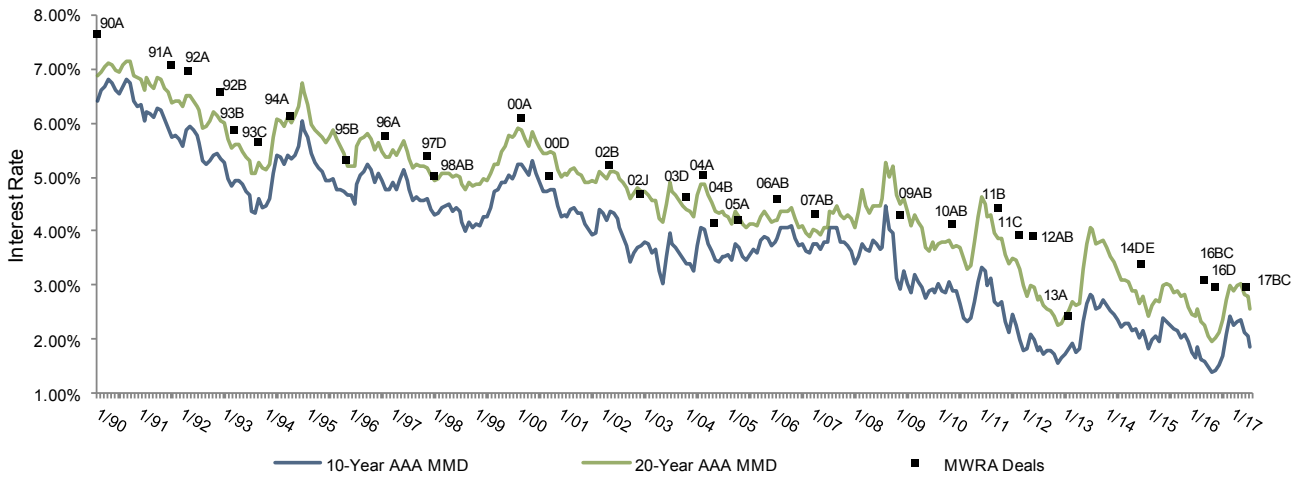
### Average Cost of MWRA Debt FYTD

Fixed Debt (\$3,487)	3.81%
Variable Debt (\$464.1)	1.34%
SRF Debt (\$951.0)	1.43%
 Weighted Average Debt Cost (\$5,093)	 3.11%

### Most Recent Senior Fixed Debt Issue May 2017

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

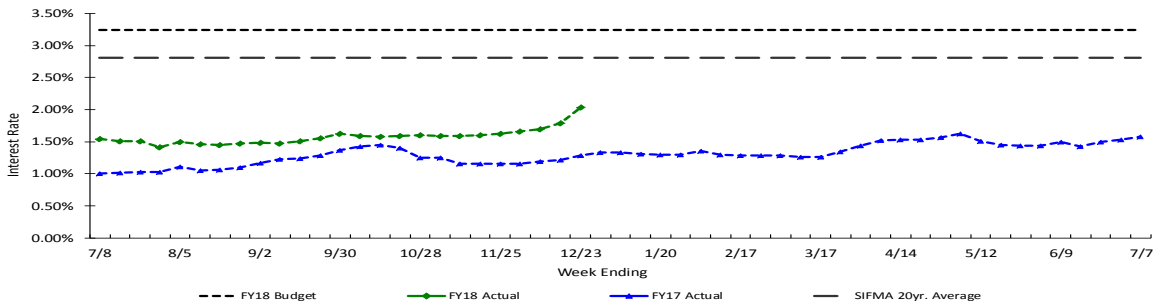


Bond Deal	1992B	1993B	1993C	1994A	1995B	1996A	1997D	1998AB	2000A	2000D	2002B	2002J	2003D	2004A
Rate	6.58%	5.89%	5.66%	6.15%	5.34%	5.78%	5.40%	5.04%	6.11%	5.03%	5.23%	4.71%	4.64%	5.05%
Avg Life	6.3 yrs	19.8 yrs	19.1 yrs	19.5 yrs	20.5 yrs	19.5 yrs	21.6 yrs	24.4 yrs	26.3 yrs	9.8 yrs	19.9 yrs	19.6 yrs	18.4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

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

### Weekly Average Variable Interest Rates vs. Budget

MWRA currently has ten variable rate debt issues with \$835.2 million outstanding, excluding commercial paper. Of the ten 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 1.71% to a low of 0.97% 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.

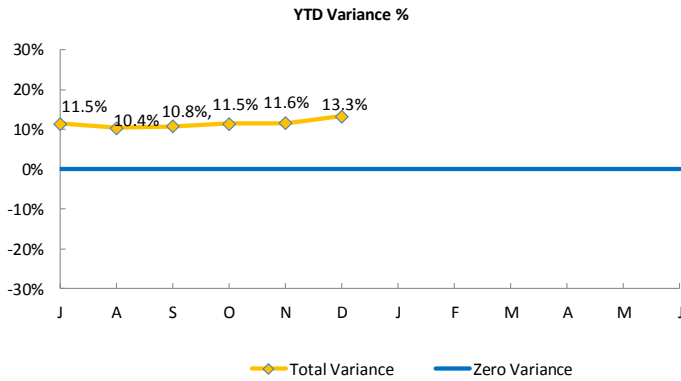




# Investment Income

## 2<sup>nd</sup> Quarter – FY18

### Year To Date



	YTD BUDGET VARIANCE			
	(\$000)			
	BALANCES IMPACT	RATES IMPACT	TOTAL	%
Combined Reserves	(\$1)	\$29	29	4.3%
Construction	\$41	\$108	149	38.0%
Debt Service	\$28	\$205	234	33.1%
Debt Service Reserves	(\$1)	(\$7)	(8)	-0.4%
Operating	(\$4)	\$35	31	7.5%
Revenue	\$67	\$129	196	46.7%
Redemption	\$0	(\$1)	(1)	-0.3%
<b>Total Variance</b>	<b>\$131</b>	<b>\$499</b>	<b>\$630</b>	<b>13.3%</b>

### YTD Average Balances Budgeted vs. Actual

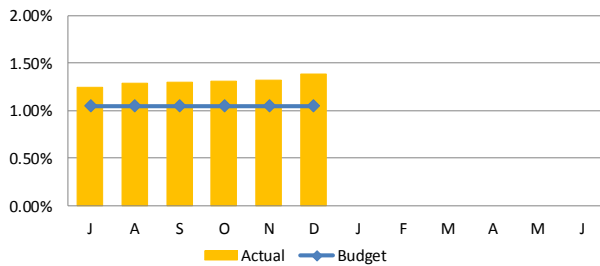


### YTD Average Interest Rate Budgeted vs. Actual

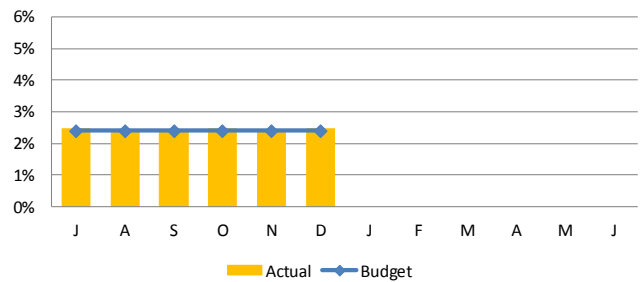


### Monthly

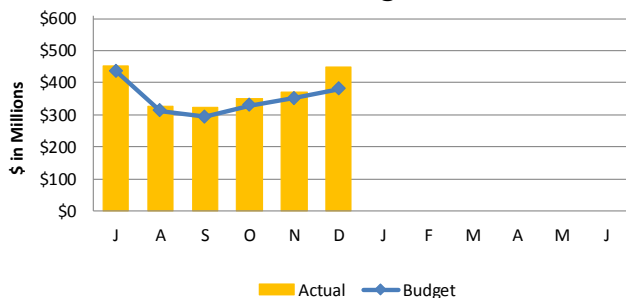
#### Short -Term Interest Rates



#### Long -Term Interest Rates



#### Short-Term Average Balances



#### Long-Term Average Balances

