

MASSACHUSETTS WATER RESOURCES AUTHORITY

Board of Directors Report

on

Key Indicators of MWRA Performance

for

Fourth Quarter FY2018

Q1	Q2	Q3	Q4



Frederick A. Laskey, Executive Director
David Coppes, Chief Operating Officer
September 19, 2018

Board of Directors Report on Key Indicators of MWRA Performance

Fourth 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.

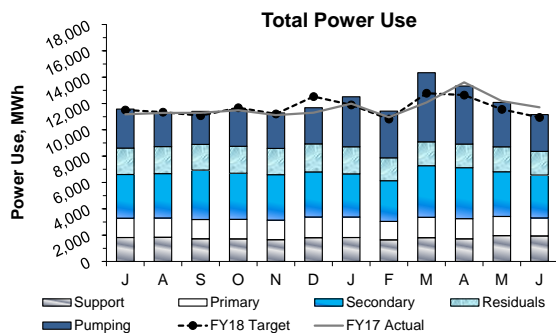
Frederick A. Laskey, Executive Director
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OPERATIONS AND MAINTENANCE

Deer Island Operations

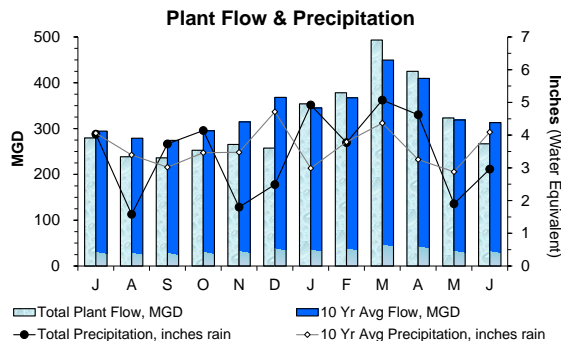
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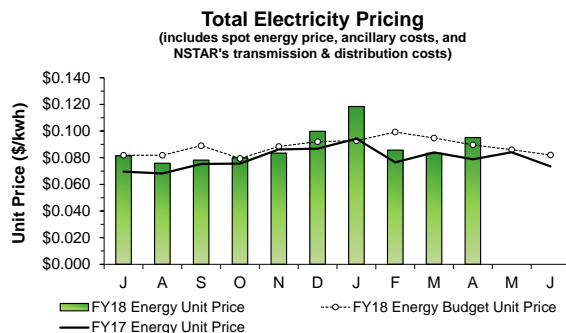
Total power usage in the 4th Quarter was 4.1% above target as Total Plant Flow was 3.5% above target with the 3 year average plant flow. While power used in most areas of the plant were similar to target, power used for wastewater pumping was 3.9% higher than target due to higher plant flow, and usage in the secondary activated sludge treatment process, including for cryogenic oxygen production, was 11.8% above target due to an increased dissolved oxygen demand as a result of higher plant flow and warmer wastewater temperatures. **Overall, total power usage in FY18 was 2.6% above target as total plant flow was 3.5% above the 3 year average plant flow target.**

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



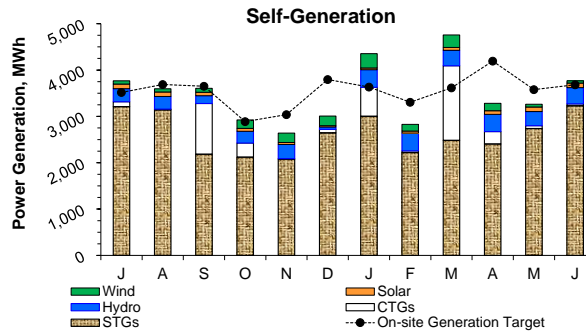
Total Plant Flow for the 4th Quarter was 2.5% below target with the 10 year average plant flow (338.3 MGD actual vs. 347.1 MGD expected) as precipitation for the quarter was 7.3% below target (9.48 inches actual vs. 10.22 inches expected). **Total Plant Flow in FY18 was 6.4% below target as precipitation was 5.7% below target.**

Note: Plant Flow projections are based on 10 year averages.

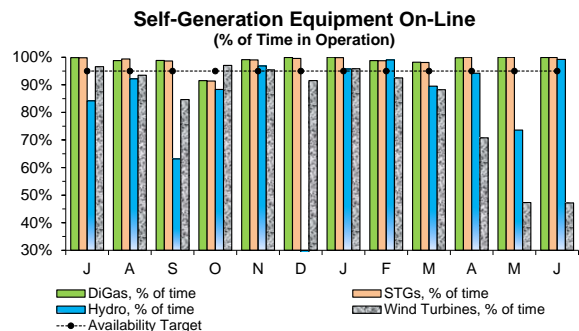


Under the current energy supply contract, a block portion of DI's energy is a fixed rate and the variable load above the block is purchased in real time. The actual total energy unit prices in May and June (Quarter 4) are not yet available as the complete invoices have not been received. The actual Total Energy Unit Price for FY18 through April (the most current invoice available) was on target (-0.9%) with budgetary estimates. The Total Energy Unit Price includes a fixed block price, spot energy price, transmission & distribution charges, and ancillary charges.

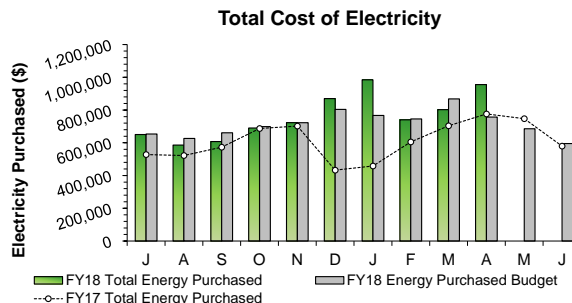
Note: Only the actual energy prices are reported. Therefore, the dataset lags by two (2) months due to the timing of invoice receipt and



Power generated on-site during the 4th Quarter was 10.0% below target. Power generated by the STGs exceeded target by 4.3%. However, generation by the CTGs, Hydro Turbines, Solar Panels, and Wind Turbines were below target. The CTGs were operated once as a precaution during a rain event, for an ISO-NE demand response audit event, and for routine maintenance/checkout purposes. The target includes CTG operation during a number of storm events. Generation by the Hydro Turbines was 38.8% below target as Hydro Turbine #1 was out of service pending repair of the rotating assembly. Wind Turbine generation were 40.2% below target due to failed electrical and hydraulic components which left Turbine #2 out of service since April 17. **Overall, power generation was 1.9% below target for FY18.**



The DiGas system and STGs exceeded the 95% availability target for the 4th Quarter. Hydro Turbine availability in April and May fell below target due in part to high plant flow events causing the turbine to trip offline and Turbine #2 being out of service for seven (7) days pending a motor replacement. Additionally, Turbine #1 remains out of service pending repair of the rotating assembly. Wind Turbine availability fell below target due to an issue with failed electrical and hydraulic components which has left Turbine #2 out of service since April 17. **Overall in FY18, the DiGas and STGs exceeded the 95% availability target, while Hydro Turbine availability was 12.5% below target and Wind Turbine availability was 11.6% below target.**



The invoices for the total cost of Electricity Purchased for May and June (Quarter 4) have not been received as of reporting time. Year-to-date Total Cost of Electricity is \$305,186 (4.2%) higher than budgeted through April as the Total Electricity Purchased is 4.8% higher than target through April.

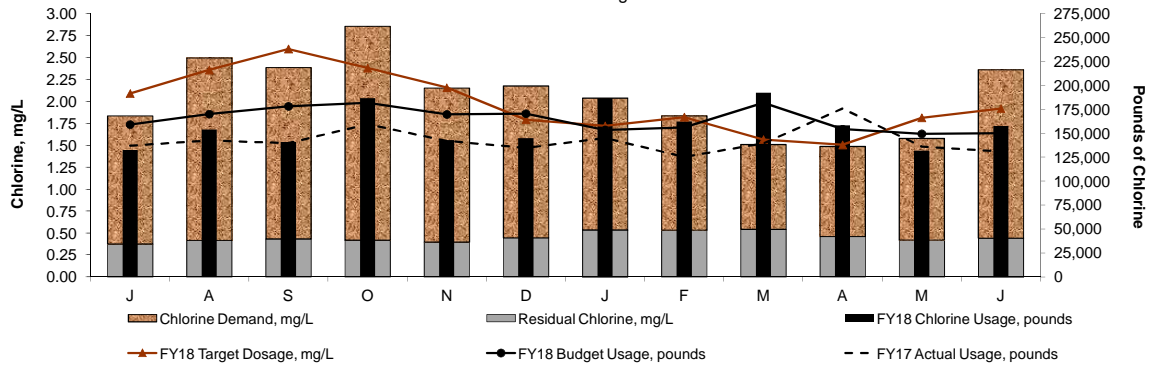
Note: Only the actual energy prices are reported. Therefore, the dataset lags by two (2) months due to the timing of invoice receipt and review.

Deer Island Operations

4th Quarter - FY18

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Deer Island Sodium Hypochlorite Use Disinfection Dosage and



The disinfection dosing rate in the 4th Quarter was 3.6% above target. DITP maintained an average disinfection chlorine residual of 0.44 mg/L this quarter with an average dosing rate of 1.81 mg/L (as chlorine demand was 1.37 mg/L). Actual sodium hypochlorite usage in pounds of chlorine was 1.4% below target this quarter as the overall plant flow was 2.5% lower than target. **Overall in FY18, disinfection dosing was 4.2% above target while sodium hypochlorite usage in pounds of chlorine was 4.3% below target.**

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

Secondary Blending Events

Month	Count of Blending Events	Count of Blending Events Due to Rain	Count of Blending Events Due to Non-Rain-Related Events	Secondary, as a Percent of Total Plant Flow	Total Hours Blended During Month
J	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	2	2	0	97.8%	27.94
F	0	0	0	100.0%	0.00
M	3	2	1	97.8%	38.98
A	3	3	0	98.9%	16.40
M	1	1	0	99.7%	4.06
J	1	1	0	99.8%	3.30
Total	14	13	1	99.2%	111.87

99.4% of all flows were treated at full secondary during the 4th Quarter. There were five (5) secondary blending events due to high plant flow resulting from heavy rain. These blending events resulted in a total of 23.76 hours of blending and 185.79 MGal of primary-only treated effluent with secondary effluent. The Maximum Secondary Capacity for the entire quarter was 700 MGD.

Overall in FY18, 99.2% of all flows were treated at full secondary. There were a total of 14 separate secondary blending events in FY18; 13 due to high plant flows resulting from heavy rain, with or without significant snow melt. There was a single blending event that followed an unanticipated plant-wide power outage and subsequent communications failure on the centralized process information and control system ("PICS"). These 14 secondary blending events combined produced a total of 111.87 hours of blending and 930.84 MGal of flow blended with secondary effluent.

Secondary permit limits were met at all times during the 4th Quarter, as well as during all of FY18.

Deer Island Operations & Maintenance Report

Environmental/Pumping:

The plant achieved an instantaneous peak flow rate of 1,172.4 MGD during the evening of April 16. This peak flow occurred during a rain event that produced a single day total precipitation of 1.57 inches and a daily average plant flow of 808.4 MGD. Overall, Total Plant Flow in the 4th Quarter was 2.5% lower than the 10 year average plant flow target for the quarter.

Work on the Winthrop Terminal Facility (WTF) VFD (Variable Frequency Drive) and Synchronous Motor Replacement project was started by the contractor in January and will entail demolition of existing older obsolete equipment (electrical systems, motors and VFDs on each of the six (6) raw wastewater pumps). Demolition and installation of new equipment is expected to take approximately two (2) months followed by two (2) months of performance testing. The pumps are currently powered by 600 volts service and will be changed to 4,160 volts, consistent with other major pumps in both the South System Pump Station (SSPS) and the North Main Pump Station (NMPS). Work has been completed on WTF Pump #6 and all electrical systems have been tested. Staff began the two (2) month performance testing of Pump #6 on June 29 and the pump will remain in service as the primary pump for 60 days.

Deer Island Operations

4th Quarter - FY18

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Deer Island Operations & Maintenance Report (continued)

Environmental/Pumping (continued):

Cleaning of the North Main Pump Station (NMPS) riser took place this quarter. The ten-foot diameter North Metropolitan Relief Tunnel riser shaft and the eleven-foot diameter Boston Main Drainage Tunnel riser shaft were cleaned out. A total of 17.12 tons of material was removed and disposed of 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 NMPS. This cleaning occurs twice a year.

Secondary Treatment:

Annual turnaround maintenance was performed on Train #2 at the Cryogenic Oxygen Facility in April. This turnaround maintenance is performed on roughly half of the components and systems in the Cryo Facility. The same turnaround maintenance will be performed on Train #1 in the fall.

Residuals:

Gravity Thickeners (GTs) 5 and 6 were both returned to service in the 4th Quarter after both units became inoperable in December 2017 (GT 5) and in mid-January (GT 6). GT 5 was returned to service in mid-May and GT 6 was returned to service in early June. The harsh environment in this process causes corrosion and weakening of the metal, requiring occasional replacement and rebuilding of mechanical components.

Odor Control:

There were 11 separate odor control facility shutdowns during the 4th Quarter ranging from approximately one (1) hour to 14 hours. All but one (1) of these were scheduled shutdowns to allow for maintenance activities including visual inspections of the airflow ductwork in each of the five (5) odor control, a complex heat exchanger replacement in the secondary odor control treatment system, in addition to other maintenance activities. The single unanticipated odor control system shutdown occurred during off hours in the North Pumping Odor Control (NPOC) Facility due to a failed remote input/output (I/O) module that controls all the other I/O modules in this facility. The duration of this shutdown was slightly over two (2) hours. Process air was contained within the buildings during these shutdowns and there were no odor complaints associated with this work.

Activated carbon in carbon adsorber (CAD) units #1 and 3 in the East Odor Control (EOC) Facility, units #4 and 7 in the West Odor Control (WOC) Facility, and units #3 and 4 in the Secondary Odor Control (SOC) Facility was changed out in June as part of routine practice to replace spent carbon.

Energy and Thermal Power Plant:

Overall, total power generated on-site accounted for 28.2% of Deer Island's total power use for the quarter. Renewable power generated on-site (by Solar, Wind, STGs, and Hydro Turbines) accounted for 27.2% of Deer Island's total electrical power use for the quarter.

The scheduled annual overhaul maintenance of CTG-1A and CTG-2B began on May 7 along with an audit inspection of each unit. These two (2) tasks were completed simultaneously on each CTG to lessen the down time of each unit and only one (1) CTG was taken out of service at a time. This work required the engine of each CTG to be separated from the generator in order to complete the maintenance and inspection, and was performed over the course of several days. Thermal Power Plant staff successfully tested each CTG following the completion of work on each unit.

CTG-1A was operated for approximately two (2) hours on June 19 for an ISO-NE declared Demand Response audit event.

Both CTG units are due for replacement of their respective fire protection systems and vibration monitoring systems and a 48 hour (weather dependent) outage will be required for each CTG in order for the contractor to complete this work. These system upgrades were completed on CTG 2B during the week of June 25. This same work is currently scheduled to take place during the week of July 23 for CTG 1A.

Work proceeded in June to repair and replace the failed electrical and hydraulic components on Wind Turbine #2 which has been out of service since April 17. Cleaning of residual hydraulic oil both inside the nacelle and on the outside of the turbine was completed by the end of May. All failed components, including a new pitch ram and hydraulic fluid tank, were replaced in the turbine by July 3. Returning the turbine to operation is pending the consultant's final report from the turbine inspection that took place on July 11.

DITP took delivery of 420,000 gallons of #2 fuel oil without incident from May 7 through May 16. 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:

On April 24, the US EPA visited Deer Island to perform a required inspection which occurs on a five year cycle. The inspector reviewed the Integrated Contingency Plan (ICP) and found it to be compliant with the requirements to maintain a Spill Prevention, Control and Countermeasure (SPCC) Plan, as well as a Facility Response Plan (FRP). The inspection also involved a physical tour of the facility and found all necessary measures to be in place so as to be deemed responsive and compliant with all relevant regulations. The plant has received approval for the plans for this cycle. Additionally, the ICP was certified by a Licensed Professional Engineer (PE) contracted by the MWRA who also reviewed and toured Deer Island in advance of the US EPA inspection.

Clinton AWWTP:

Replaced #2 Sodium Hypochlorite tank. Removed and destroyed the old tank.
Contractor made repairs to skimmer arm, #1 Gravity Thickener.
Drained, cleaned, and inspected #2 Aeration Tank. Tank placed back in service.

Phosphorus Reduction Facility: *Work completed or in progress during the Fourth Quarter:*

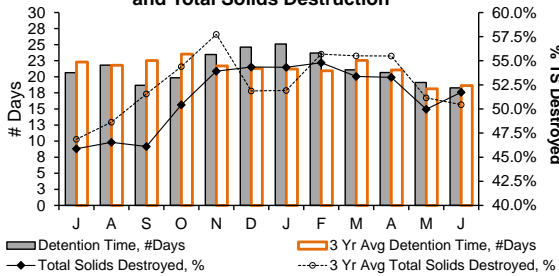
Contractor has completed performance testing of the phosphorus removal disc filters. The contractor has also completed additional testing for polymer selection.

Deer Island Operations and Residuals

4th Quarter - FY18

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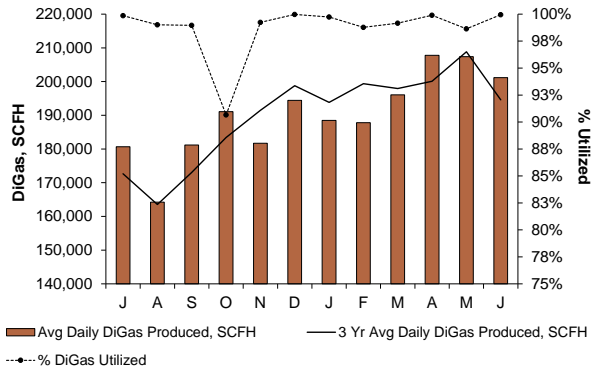
Sludge Detention Time in Digesters and Total Solids Destruction



Total solids (TS) destruction following anaerobic sludge digestion averaged 51.7% during the 4th Quarter, 1.4% below the 3 year average of 52.4% as the sludge detention time in the digesters was 19.4 days. DI operated with an average of 7.9 digesters slightly lower than the 3 year average of 8.0 digesters. **Overall in FY18, TS destruction averaged 51.2%, slightly lower than the 3 year average of 52.6%. Sludge detention time was 21.4 days, similar to the 3 year average of 21.3 days.**

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

Digester Gas Production and % Utilized

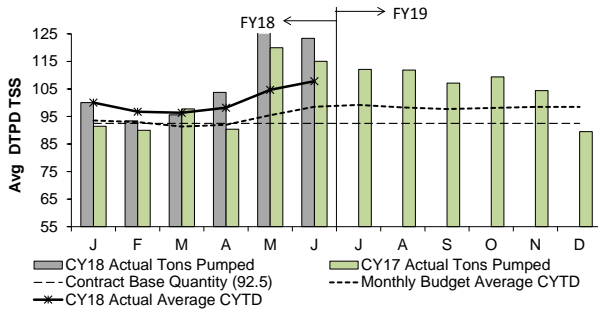


The Avg Daily DiGas Production in the 4th Quarter was 2.1% above target with the 3 Year Avg Daily DiGas Production. On average, 99.5% of all the DiGas produced in the quarter was utilized at the Thermal Power Plant. **Overall in FY18, the Avg Daily DiGas Production was on target (+0.2%), with an average of 98.7% utilization of DiGas in the Thermal Power Plant.**

Residuals Pellet Plant

MWRA pays a fixed monthly amount for the calendar year to process up to 92.5 DTPD/TSS as an annual average. The monthly invoice is based on 92.5 DTPD/TSS (Dry Tons Per Day/Total Suspended Solids) times 365 days divided by 12 months. At the end of the year, the actual totals are calculated and additional payments are made on any quantity above the base amount. The base quantity of 90.0 DTPD/TSS was changed to 92.5 DTPD/TSS starting on January 1, 2016 with the terms of the new contract. On average, MWRA processes more than 92.5 DTPD/TSS each year (FY18's budget is 99.5 DTPD/TSS and FY19's budget is 98.9 DTPD/TSS).

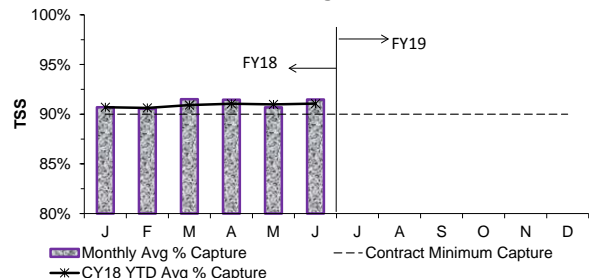
Sludge Pumped From Deer Island



The average quantity of sludge pumped to the FRSA Pellet Plant in the 4th Quarter was 119.3 DTPD - above target with the FY18 budget of 105.7 DTPD for the same period. Sludge delivered to FRSA was higher than expected mainly due to higher than expected primary and secondary sludge production.

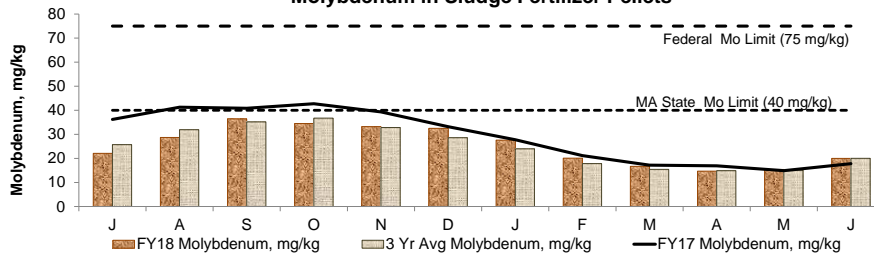
The CY18 average quantity of sludge pumped through June is 107.8 DTPD - 9.4% above target, compared with the CY18 average budget of 98.5 DTPD for the same time period.

Monthly Average % Capture of Processed Sludge



The contract requires NEFCo to capture at least 90.0% of the solids delivered to the Biosolids Processing Facility in Quincy. The average capture for the 4th Quarter was 91.2% and the CY18 to date average capture is 91.1%.

Molybdenum in Sludge Fertilizer Pellets



Copper, lead, and molybdenum (Mo) are metals of concern for MWRA as their concentrations in its biosolids have, at times, exceeded regulatory standards for unrestricted use as fertilizer. Molybdenum-based cooling tower water is a significant source of Mo in the sludge fertilizer pellets. The Federal standard for Mo is 75 mg/kg. In 2016, Massachusetts Type I biosolids standard for molybdenum was changed to 40 mg/kg from the previous standard of 25 mg/kg. This has allowed MWRA to sell its pellets in-state for land application 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 since NEFCo does not distribute product that does not meet the suitability standards.

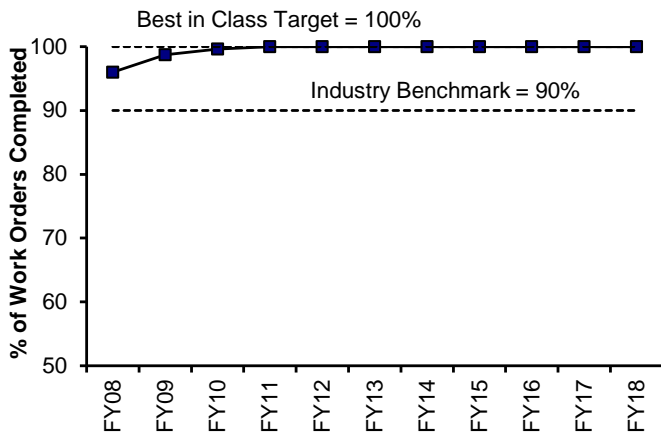
The levels have been below the DEP Type 1 limit for all three metals (Also see Page 14). For Mo, levels in the Fore River sludge fertilizer pellets during the 4th Quarter of FY18 averaged 16.7 mg/kg, similar to the 3 year average, and 58% below the MA State Limit, and 78% below the Federal Limit.

Deer Island Yearly Maintenance Metrics

4th Quarter - FY18

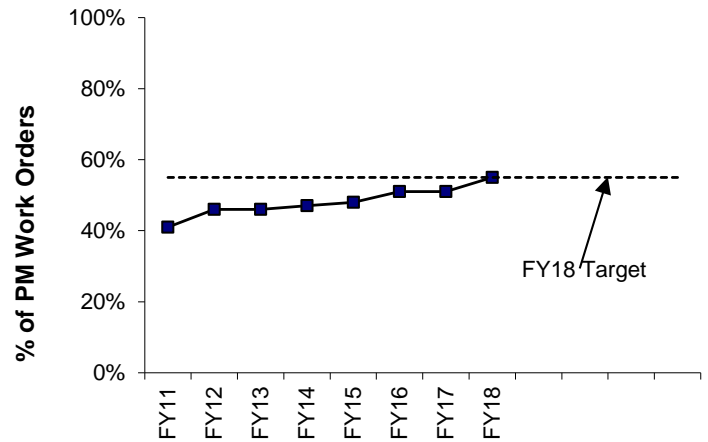
Proactive and Productivity Measures

Preventive Maintenance



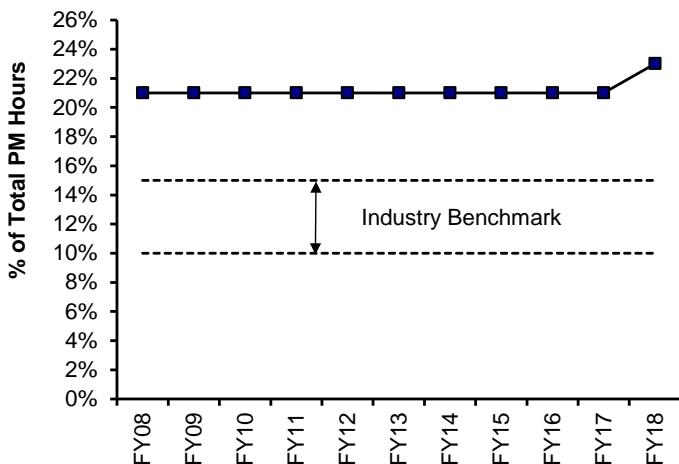
The industry benchmark is 90% for Preventive Maintenance (PM) completion. Upon reaching the 90% goal in FY05, the target goal was increased to the "Best in Class" Target of 100% PM completion. Since then, the percentage of PM work order completion has been at 99% or higher. Reliability-Centered Maintenance (RCM) and PM optimization efforts have continued since FY01. PM completion rate was 99.9% in FY18.

Preventive Maintenance Kitting



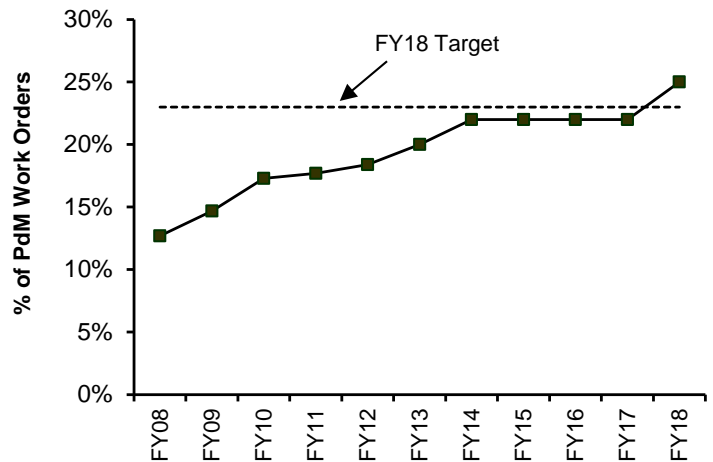
Preventive Maintenance (PM) inventory items were loaded into Maximo to assign spare parts for equipment to PM work orders. DITP reached the PM kitting goal of 100% in FY10. In FY11 a new graph (above) was developed to track kitting of all maintenance work orders in an effort to increase wrench time. Staff continues to fine-tune the process to "kit" all maintenance work orders. Kitting is considered a best practice by maintenance and reliability professionals. It entails staging parts necessary to complete maintenance work. Kitting allows maintenance staff to spend more time "turning the wrench" and less time waiting for parts at the stockroom window. Kitting for FY18 was 55%, equalling DITP's new

Operations Light Maintenance PMs



The percentage of preventive maintenance work order hours completed by Operations staff (not maintenance staff) increased from less than 1% in January 2002 to the current level of 23% in FY18. DITP reached the industry benchmark range of 10-15% in April 2003 and has exceeded the goal through FY18. Operations completes approximately 650 PM work orders per month.

Predictive Maintenance

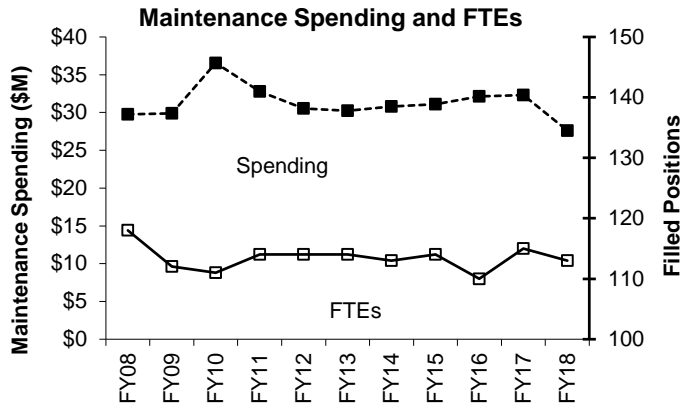


Predictive maintenance has steadily increased from 2% in FY03 to 25% in FY18, DITP's FY18 new goal of 23% was exceeded. The increase in predictive maintenance was achieved through the expanded use of lubrication, vibration, thermography, and acoustic ultrasonic testing techniques. The Condition Monitoring Group continually reviews and investigates new opportunities and initiatives to expand condition monitoring testing and analysis.

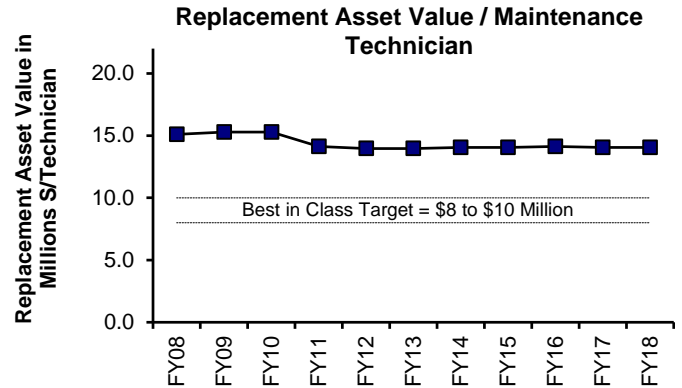
Deer Island Yearly Maintenance Metrics

4th Quarter - FY18

Overall Maintenance Program Measures

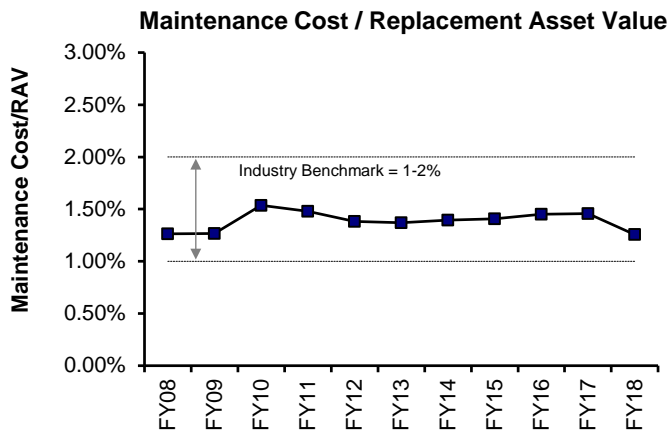


DITP's Maintenance staff is currently at 113 FTE's. Maintenance has been successful in meeting its goals through implementation of numerous maintenance efficiencies including: Operations staff performing light maintenance, cross-functional training and flexibility, and Reliability-Centered Maintenance.

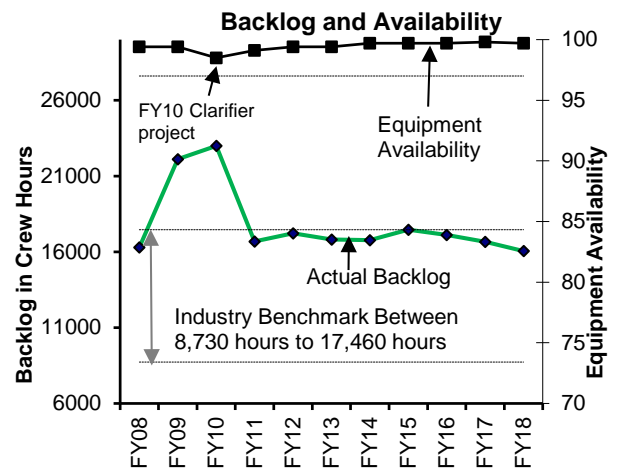


DITP adopted a "best in class" target of \$8-\$10 Million/Technician for maintenance staffing. Even after a period of downward trending, DITP remains above this Best in Class target range. However, as the plant ages and additional equipment replacements are expected, DITP management will reassess staffing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

The Maintenance Spending graph shows actual annual maintenance spending and large CIP asset replacements (equipment costs only). Maintenance budgeting continues to evaluate plant assets and requirements for replacement of obsolete equipment to ensure the plant operates at maximum efficiency. In FY18, overall spending decreased from FY17 due to some Maintenance Projects being delayed; Exterior Door Contract, Coatings Contract, PICS Upgrade and Lighting Demand. Scheduled and completed projects during FY18 included: Secondary Battery A & B Valve Replacements, Residuals Rotary Screen Rebuild, Rebuilding of Scum Hoppers, Winthrop Terminal Facility Valve Replacement and Rehabilitation of Gravity Thickeners #5 and #6. The large spike in FY10 and FY11 is attributed to the Clarifier Rehabilitation Project (\$58M), which was an on-going during that period.



The industry benchmark for annual maintenance spending is between 1% to 2% of replacement asset value, currently DITP is at 1.26%. The plant's replacement asset value is calculated at approximately \$2.4 billion dollars. DITP's current maintenance spending is within the industry benchmark. As the plant ages and equipment replacement is required, spending is expected to increase. DITP Maintenance CEB spending is \$12.1 million coupled with CIP spending which funded Secondary Battery A & B Valve Replacements, Rebuilding of Scum Hoppers, Winthrop Terminal Facility Valve Replacement and Gravity Thickeners #5 and #6 Rehabilitation.



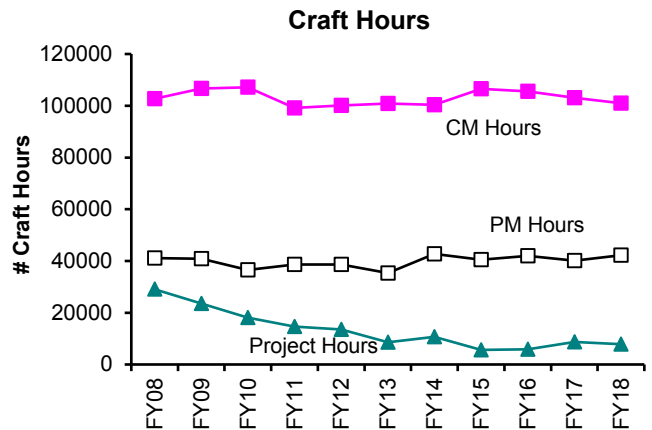
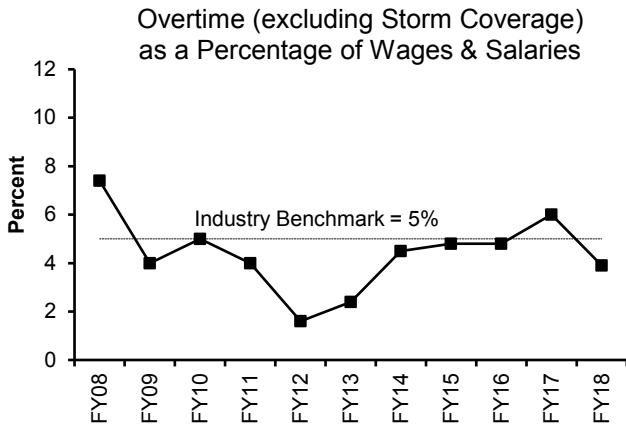
Industry benchmark for Equipment Availability is 97% and over the last ten years, equipment availability has consistently exceeded the benchmark. In FY18 the availability was 99.7%. The slight decrease in Equipment Availability during FY18 was due to the Internal Rehabilitation of Gravity Thickeners #5 and #6. FY10's decrease was due to the Clarifier Rehabilitation Project.

Industry Benchmark for Backlog is between 8,730 to 17,460 hours for maintenance based on current staffing, the total average backlog for FY18 was 16,052 hours, which is below the industry benchmark. The slight decrease in backlog is from utilizing staff during Cable Outages and Wet Weather to perform light maintenance tasks.

Deer Island Yearly Maintenance Metrics

4th Quarter - FY18

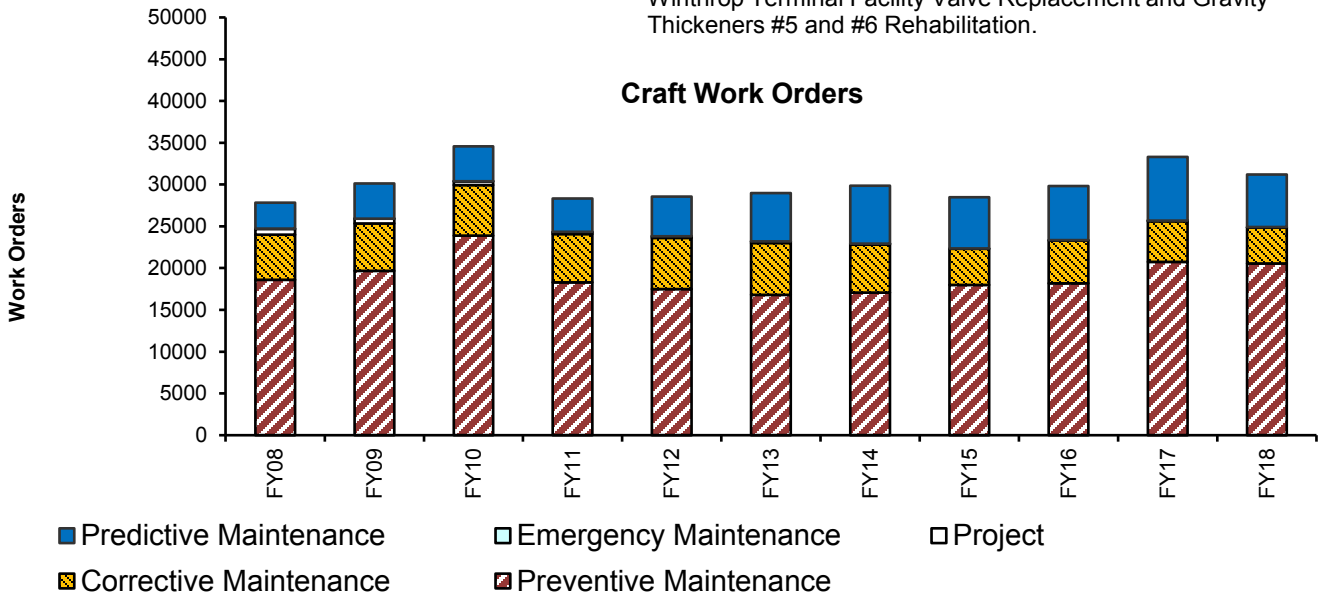
Overall Maintenance Program Measures (cont.)



Management continues its effort to keep overtime below the industry benchmark. DITP maintenance overtime was 3.9% for FY18. Management has taken steps to reduce overtime spending by limiting overtime to repair critical equipment and systems only. DITP has been on or under Industry Benchmark from FY08 through FY16. The increase in overtime in FY17 was due to the Eversource Cable Outage Project.

Continued optimization of the Preventive Maintenance (PM) program through the transfer of some light maintenance tasks from Maintenance to Operations staff (23% of PM hours at the end of FY18), elimination of duplicate work orders, increasing PM frequency due to equipment history and performance. Installation of new equipment and combining some PM's resulted in a slight increase in PM hours in FY18.

Corrective Maintenance (CM) hours slightly decreased from last year. Project Maintenance hours slightly decreased due to a number of CIP projects being completed: Secondary Battery A & B Valve Replacements, Residuals Rotary Screen Rebuild, Winthrop Terminal Facility Valve Replacement and Gravity Thickeners #5 and #6 Rehabilitation.



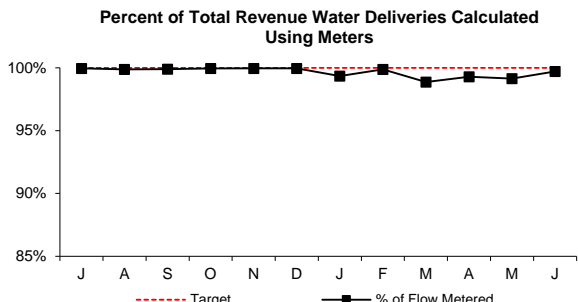
During FY18, the number of work orders decreased by 2,180 from the previous year. The decrease in work orders was due to Planning combining some PM work orders. The number of Corrective Maintenance (CM) work orders decreased slightly in FY18. Project (PROJ) work orders decreased for FY18 due to CIP projects being completed.

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

Operations Division Metering & Reliability

4th Quarter - FY18

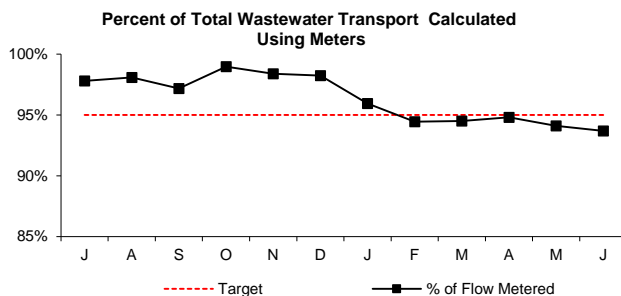
WATER METERS



The target for revenue water deliveries calculated using meters is 100%. Estimates are generated for meters that are out of service due to instrumentation problems or in-house and capital construction projects. During the 4th Quarter FY18, meter actuals accounted for 99.4% of flow; only 0.6% of total revenue water deliveries were estimated.

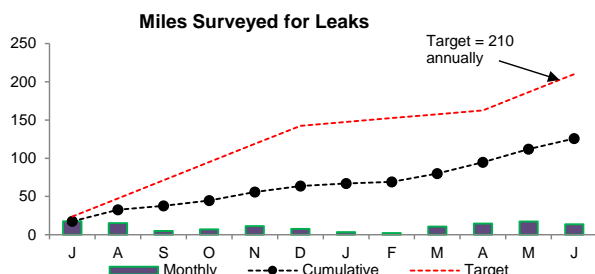
The following is the breakdown of reasons for estimations:
 In-house and Capital Construction Projects - 0.33%
 Instrumentation Failure - 0.27%

WASTEWATER METERS



The target for revenue wastewater transport calculated using meters is 95%. Estimates are generated for meters missing data due to instrument failure and/or erratic meter behavior. Estimates are produced using data from previous time periods under similar flow conditions. During the 4th Quarter FY18, meter actuals accounted for 94.2% of flow; 5.8% of wastewater transport was estimated. Due to equipment issues with older meters not currently supported by the vendor and staffing vacancies.

WATER DISTRIBUTION SYSTEM PIPELINES



During the 4th Quarter of FY18, 45.75 miles of water mains were inspected. The total inspected for the fiscal year to date is 125.78 miles. Below target due to high volume of Community assistance requests.

Month	J	A	S	O	N	D	J	F	M	A	M	J	Totals
Leaks Detected	4	2	4	6	5	2	1	0	3	4	1	2	34
Leaks Repaired	2	1	3	7	2	3	2	1	2	2	3	3	31
Backlog	8	9	10	9	12	11	10	9	10	12	10	9	n/a

During the 4th Quarter of FY18, seven new leaks were detected, eight leaks were repaired. Refer to FY18 Leak Report below for details. Also, community service ranging from individual leak location to hydrant surveys was conducted for: Arlington, Malden, Medford, Milton, Newton, Revere, Saugus, Somerville, Stoneham and support to MWRA Contract #7478 Stoneham.

FY18 Leak Report - 4th 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
12/12/17	#352 Norfolk St. Cambridge.	01/23/18
01/09/18	Madison @ Main Street, Malden	01/22/18
07/26/16	Reservoir Playground, Cleveland Circle	02/28/18
03/20/18	Frontage Rd. @ Veneer St, Arlington (main break)	03/21/18
03/28/17	50 Sherman St., Sec-85 Revere	03/30/18
11/02/17	Frontage Rd. @ Veneer St., Arlington	04/02/18
03/25/18	Second St. @ Market St., Everett	04/27/18
04/22/18	Mt Vernon @ Perkins St., Somerville	05/09/18
04/09/18	Middlesex @ McGrath Hwy., Somerville	05/09/18
05/30/18	#125 R Sea Ave. MWRA Sewer P.S. Quincy	05/31/18
06/07/18	Bennington St. @ Winthrop St., Revere	06/07/18
06/14/18	Clyde St. @ Lee St. Brookline	06/15/18
04/09/18	175 Fellsway @ Middlesex Ave., Somerville	06/20/18

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.
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.
11/20/17	Peabody St., @ Washington St., Newton. Air Valve leak, not surfacing.
11/26/17	Nonantum Rd. @ Maple St., Newton. Air valve leak, not surfacing.
04/20/18	#634 Mystic Ave. @ Mt Vernon, Somerville; Not surfacing, August repair scheduled.

Water Distribution System Valves

4th Quarter - FY18

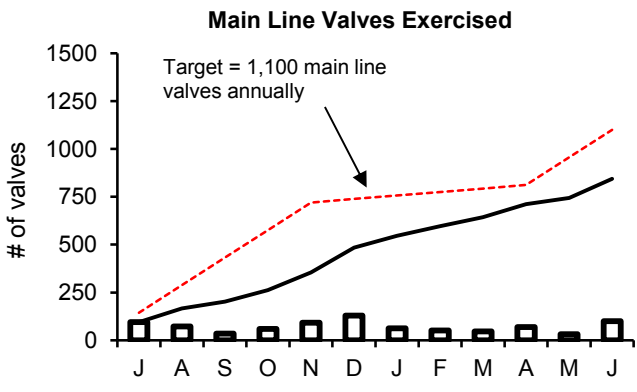
Background

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.

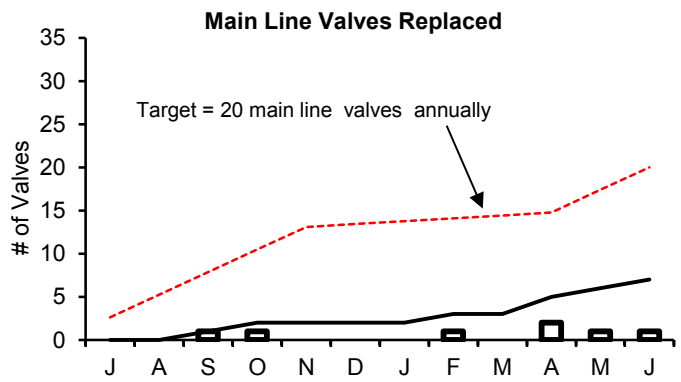
Type of Valve	Inventory #	Operable Percentage	
		FY18 to Date	FY18 Targets
Main Line Valves	2,159	96.5%	95%
Blow-Off Valves	1,317	98.0%	95%
Air Release Valves	1,380	94.9%	95%
Control Valves	49	100.0%	95%

Key to Symbols:

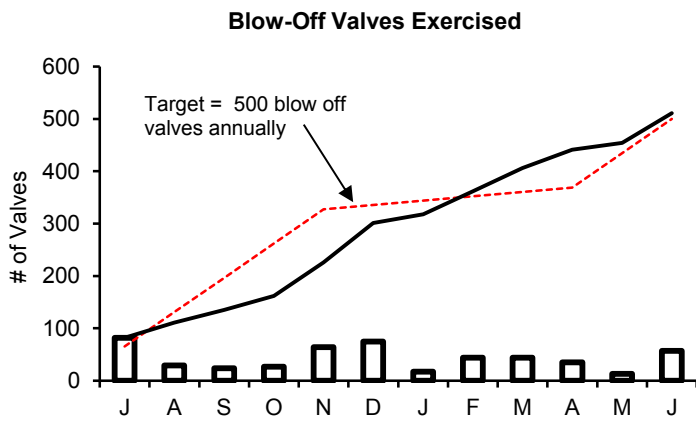
- FY18 Monthly Total
- FY18 Cumulative Total
- FY18 Target



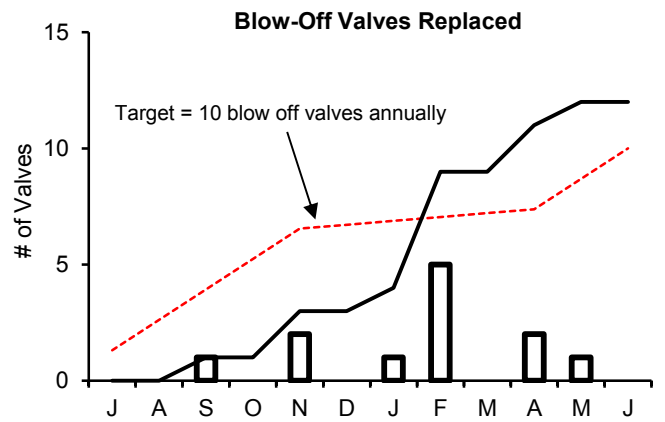
During the 4th Quarter of FY18, 201 main line valves were exercised. The total number exercised for the fiscal year was 844. Below target due to extensive valve operations support provided to the CIP construction contracts, primarily on the Northern Intermediate High projects.



During the 4th Quarter of FY18, four main line valves were replaced. The total replaced for the fiscal year was seven. Below target due to other projects such as Watertown Pipeline coupling and leak repairs taking priority.



During the 4th Quarter of FY18, 105 blow off valves were exercised. The total exercised for the fiscal year was 511.



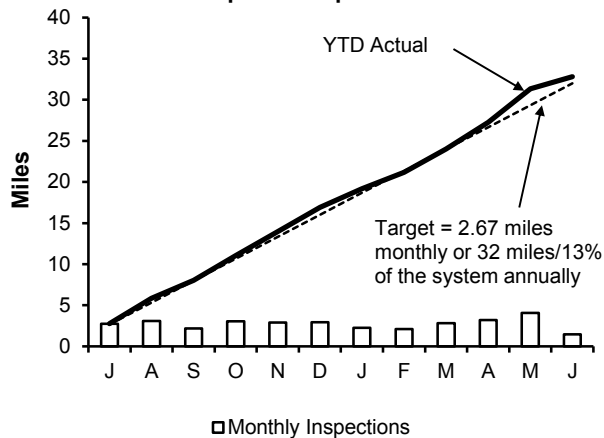
During the 4th Quarter of FY18, there were three blow off valves replaced. The total replaced for the fiscal year was twelve.

Wastewater Pipeline and Structure Inspections and Maintenance

ONB 4th Quarter - FY18

Inspections

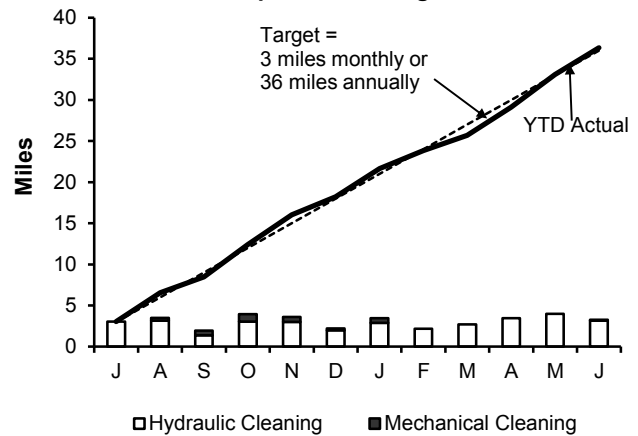
Pipeline Inspections



Staff internally inspected 8.77 miles of MWRA sewer pipeline during this quarter. The year to date total is 32.81 miles. No Community Assistance was provided this quarter.

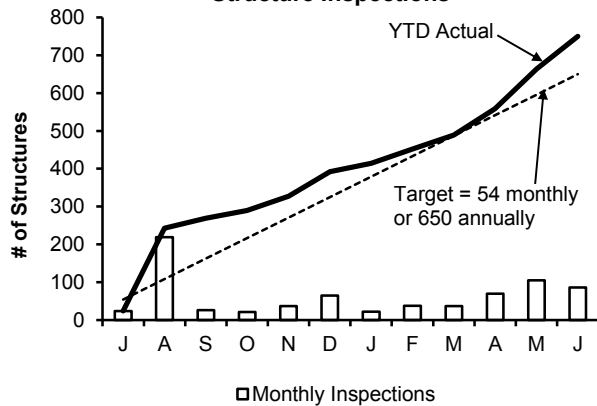
Maintenance

Pipeline Cleaning



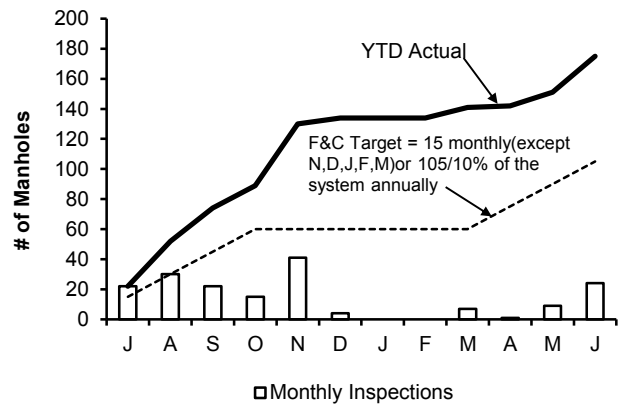
Staff cleaned 10.67 miles of MWRA's sewer system and removed 49 yards of grit and debris during this quarter. The year to date total is 36.25 miles. No Community Assistance was provided this quarter.

Structure Inspections



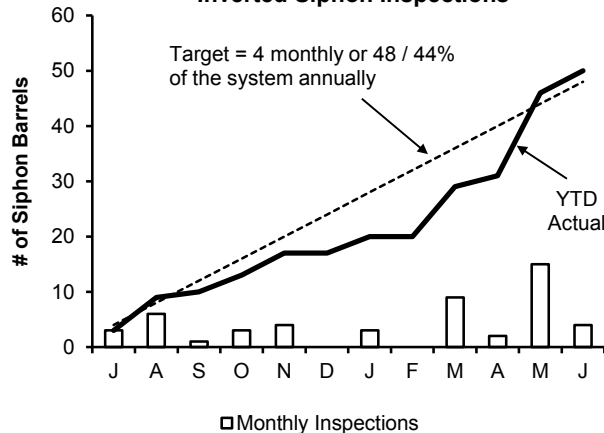
Staff inspected the 36 CSO structures and performed 255 additional manhole/structure inspections during this quarter. The year to date total is 750 inspections.

Manhole Rehabilitation



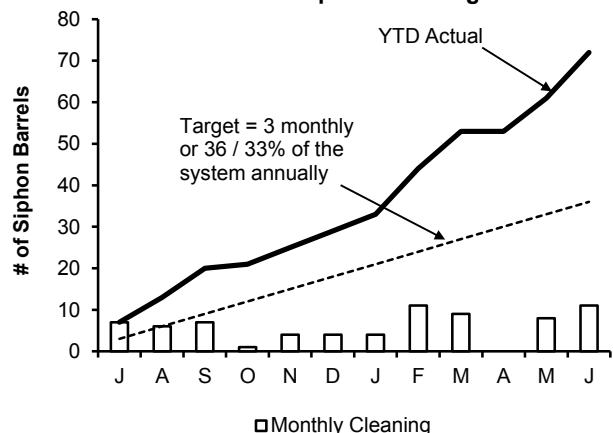
Staff replaced 34 frame & cover during this quarter. The year to date total is 175.

Inverted Siphon Inspections



Staff inspected 21 siphon barrels this quarter. Year to date total is 50 inspections.

Inverted Siphon Cleaning

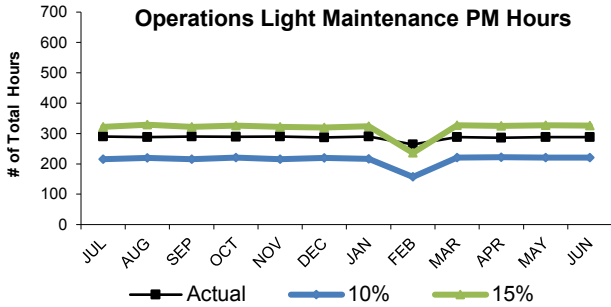


Staff cleaned 19 siphon barrels during this quarter. Year to date total is 72.

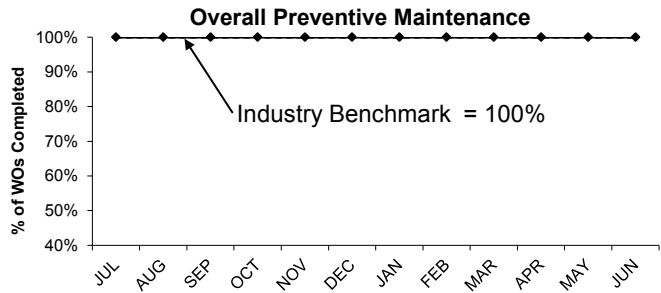
Field Operations' Metropolitan Equipment & Facility Maintenance

4th Quarter - FY18

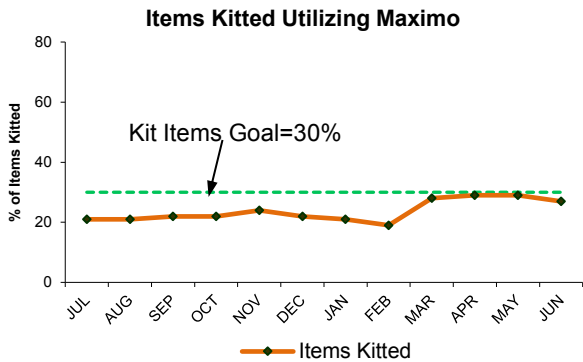
Several maintenance and productivity initiatives are in progress. The goal for the Overall PM completion and the Operator PM completion was raised to 100% for Fiscal Year 2010. The Operator PM and kitting initiatives frees up maintenance staff to perform corrective maintenance and project work, thus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



Operations staff averaged 287 hours of preventive maintenance during the 4th Quarter, an average of 15% of the total PM hours for the 4th Quarter, which is within the industry benchmark of 10% to 15%.

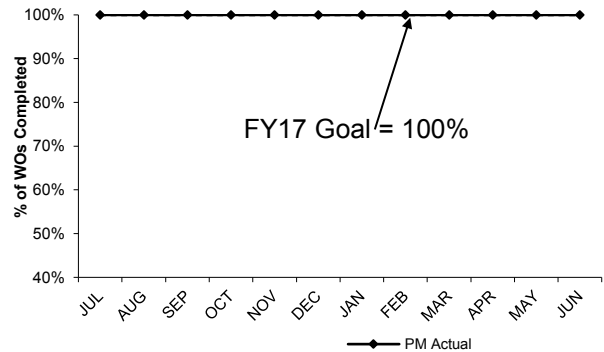


The Field Operations Department (FOD) preventive maintenance goal for FY18 is 100% of all PM work orders. Staff completed an average of 100% of all PM work orders in the 4th Quarter.

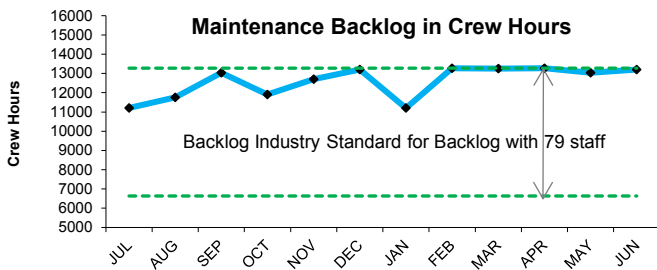


Operation's FY18 maintenance kitting goal has been set at 30% of all work orders to be kitted. Kitting is the staging of parts or material necessary to complete maintenance work. In the 4th Quarter, 28% of all applicable work orders were kitted. This resulted in more wrench time and increased productivity.

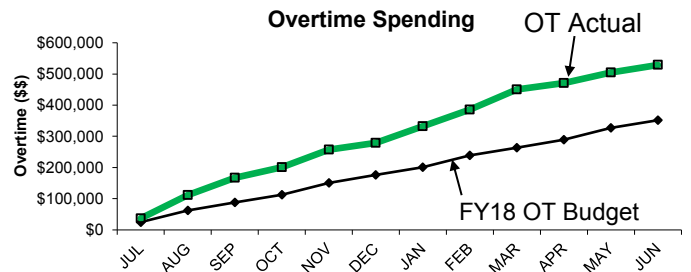
Operations Light Maintenance % PM Completion



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 4th



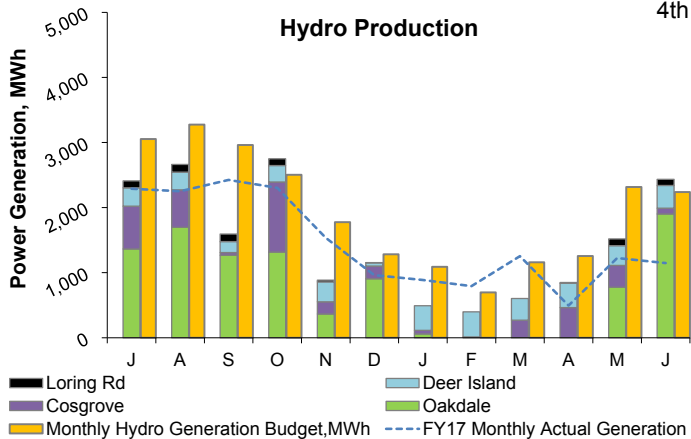
The 4th Quarter backlog average is 13168 hours. Management's goal is to continue to control overtime and still stay within the industry benchmark of 6636 to 13275 hours.



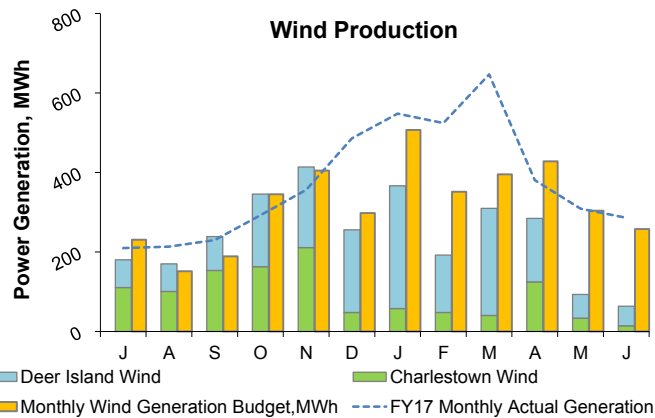
Maintenance overtime was at budget for the 4th Quarter. Overtime was used for critical maintenance repairs. Overtime for FY18 is \$529k which is \$177k over budget for the fiscal year.

Renewable Electricity Generation: Savings and Revenue

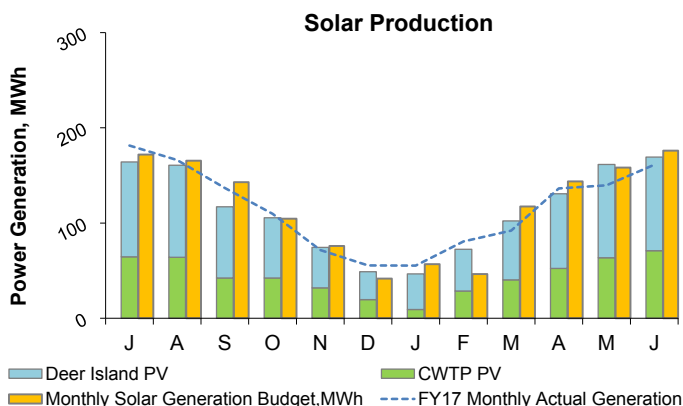
4th Quarter - FY18



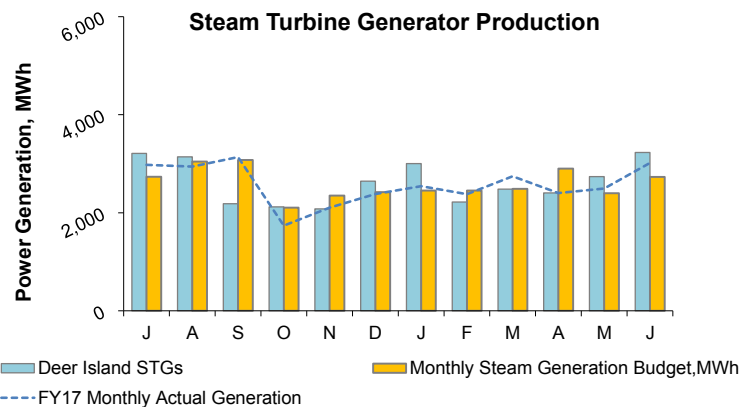
In the 4th quarter, the renewable energy produced from all hydro turbines totaled 4,806 MWh; 17% below budget³. The total energy produced in FY18 is 17,760 MWh; 25% below budget³. Oakdale attributed to most of the under-budget value (approximately 13% of it) mainly due to limited Quabbin transfers. Also, Cosgrove generation values have been 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 revenue² to date in FY18 (actuals through April¹) is \$596,740; 41% below budget³, due to the reasons stated above. The savings and revenue value does not include RPS REC revenue (see next page).



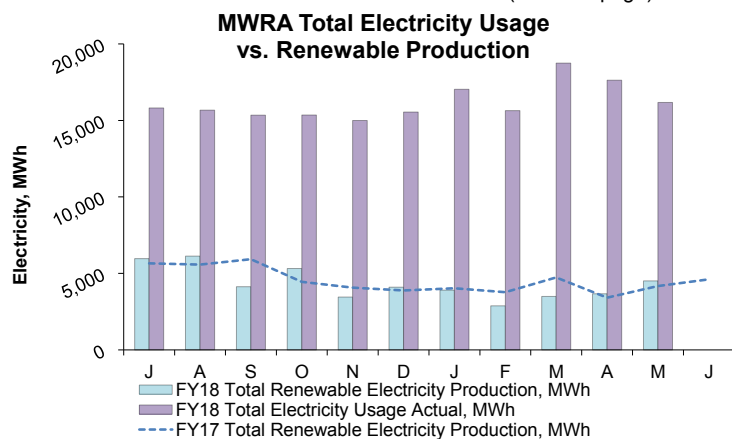
In the 4th quarter, the renewable energy produced from all wind turbines totaled 441 MWh; 55% below budget³; mostly due to Charlestown Wind and DI T2 turbines undergoing repairs. The total energy produced in FY18 is 2,914 MWh; 25% below budget³. The total savings and revenue² to date in FY18 (actuals through April¹) is \$415,016; 11% below budget³. The savings and revenue value does not include RPS REC revenue (see next page).



In the 4th quarter, the renewable energy produced from all solar PV systems totaled 462 MWh; 3% below budget³. The total energy produced in FY18 is 1,354 MWh; 3% below budget³. The total savings and revenue² to date in FY18 (actuals through April¹) is \$126,979; 2% below budget³. The savings and revenue value does not include RPS REC revenue (see next page).



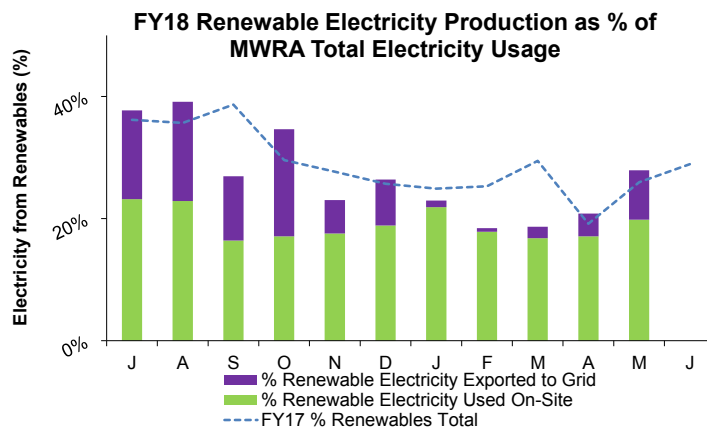
In the 4th quarter, the renewable energy produced from all steam turbine generators totaled 8,371 MWh; 4% above budget³. The total energy produced in FY18 is 31,449 MWh; 1% above budget³. The total savings and revenue² to date in FY18 (actuals through April¹) is \$2,258,820; 2% below budget³. The savings and revenue value does not include RPS REC revenue (see next page).



In the first eleven months of FY18, MWRA's electricity generation by renewable resources totaled 47,485 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 177,976 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.

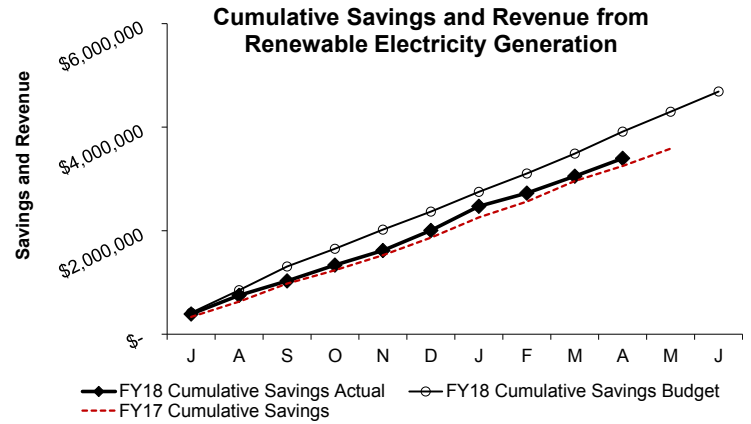
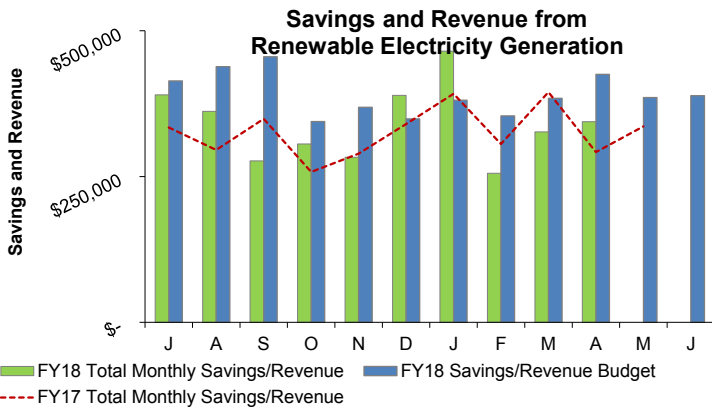
In the first 11 months of FY18, green power generation represented approximately 27% of total electricity usage. All renewable electricity generated on DI is used on-site (this accounts for more than 50% of MWRA renewable generation). Almost all renewable electricity generated off-DI is exported to the 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

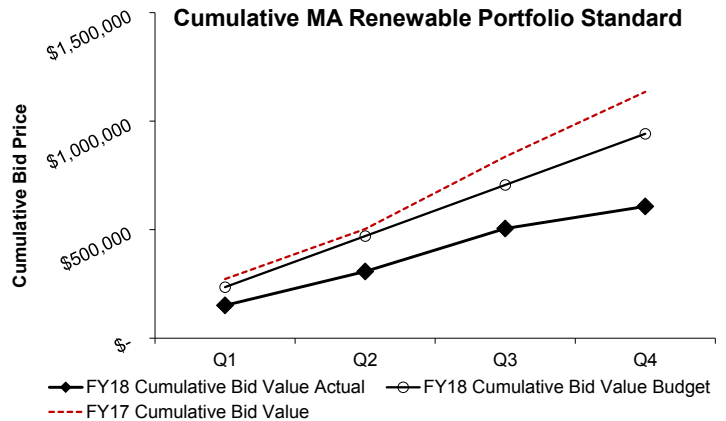
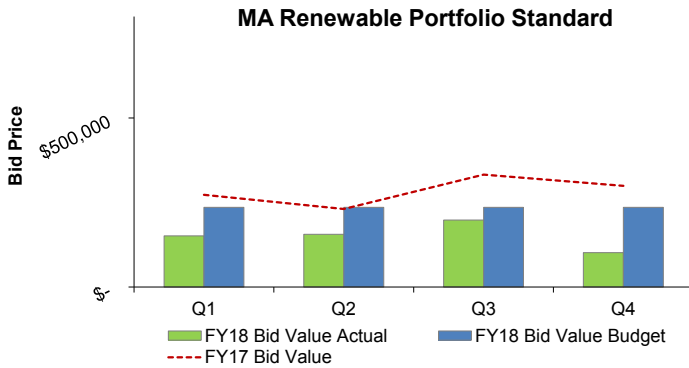
4th Quarter - FY18



Savings and revenue from MWRA renewable electricity generation in the first 10 months of FY18 (actuals only through April¹) is \$3,397,556; which is 13% below the budget³. This is mostly due to Oakdale hydro revenue being 43% under budget for the same time period. Oakdale is the second largest renewable generating facility for MWRA.

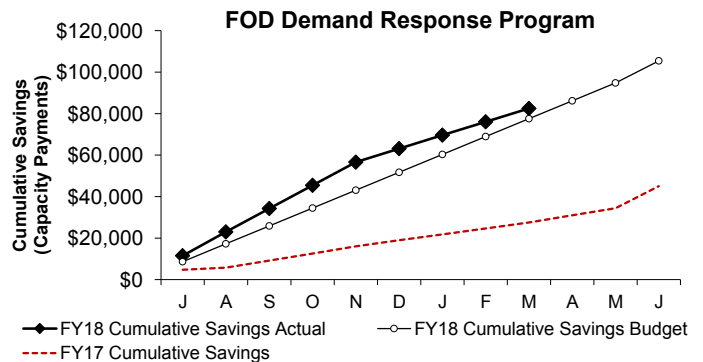
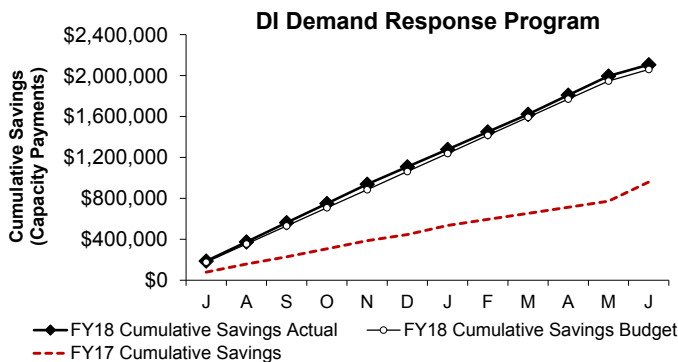
Savings and revenue² from all renewable energy sources include wind turbines, hydroelectric generators, solar panels, and steam turbines (DI). This includes savings and revenue due to electricity generation (does not include avoided fuel costs and RPS RECs).

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



Bids were awarded during the 4th Quarter¹ from MWRA's Class 1, Class 2, and Solar REC renewable energy assets; 5,541 Q4 CY2017 Class I Renewable Energy Certificates (RECs), 3,085 Class II Q4 2017 RECS, and 44 Q4 CY2017 Solar RECs (SRECs) were sold for a total value of \$101,720 RPS revenue; which is 67% below budget³ for the Quarter. This is mainly due to Class I market prices being 93% below budget 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.



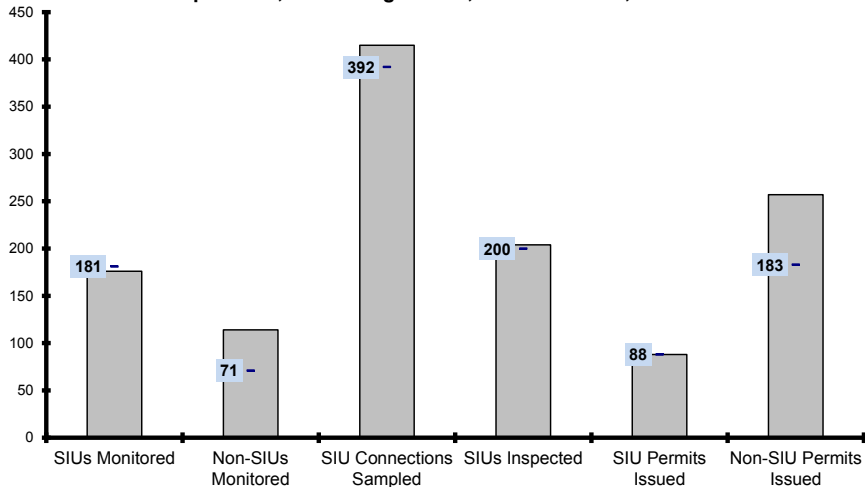
Currently Deer Island, JCWTP, and Loring Rd participate in the ISO-New England Demand Response Programs⁴. By agreeing to reduce demand and operate the facility generators to help reduce the ISO New England grid demand during periods of high energy demand, MWRA receives monthly Capacity Payments from ISO-NE. When MWRA operates the generators during an ISO-NE called event, MWRA also receives energy payments from ISO-NE. FY18 Cumulative savings (Capacity Payments only) total \$2,105,986 for Deer Island and \$82,505 for FOD through March¹.

- 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

4th Quarter - FY18

Inspections, Monitoring Events, Permits Issued, Year to Date



EPA Required SIU Monitoring Events
for FY18: 181
YTD: **176**

Required Non-SIU Monitoring Events
for FY18: 71
YTD: **114**

SIU Connections to be Sampled
For FY18: 392
YTD: **415**

EPA Required SIU Inspections
for FY18: 200
YTD: **204**

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

Non-SIU Permits due to Expire
for FY18: 183
YTD: **257**

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. Due mainly to the various personnel changes affecting the TRAC department during the fiscal year, the EPA requirement was not met.

Number of Days to Issue a Permit

	0 to 120		121 to 180		181 or more		Permits Issued	
	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	3	4	3	3	1	2	7	9
Feb	2	12	2	2	0	4	4	18
Mar	1	16	6	0	0	4	7	20
Apr	7	17	4	7	3	7	14	31
May	5	20	4	6	0	6	9	32
Jun	22	10	4	4	4	4	30	18
% YTD	61%	75%	28%	13%	10%	12%	88	257

In the 4th Quarter of FY18, one hundred and thirty-four permits were issued, fifty-three of which were SIUs. Thirty-four of the fifty-three SIU permits were issued within 120 days with seven beyond the 180-day timeframe - falling far short of the EPA's 90% requirement for the year. There were thirty-four non-SIU permits issued beyond the 120-day timeframe with seventeen of them beyond the 180-day timeframe.

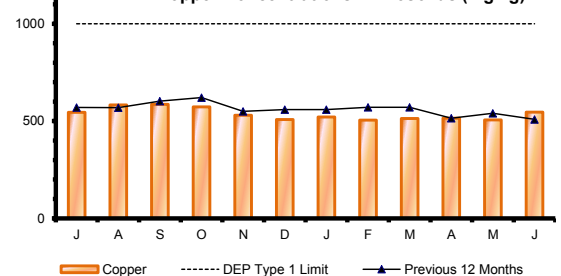
TRAC has had a very challenging year dealing with personnel changes. This has affected the workflow, resulting in delays in processing permits. Other delays were attributable to having to wait for data from the industry and/or approval from the municipality in which the industry was operating or intended to operate - this mainly affects construction dewatering permits and new start-up industries. Late payment on invoices remains a factor in late issuances.

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 this fiscal year.

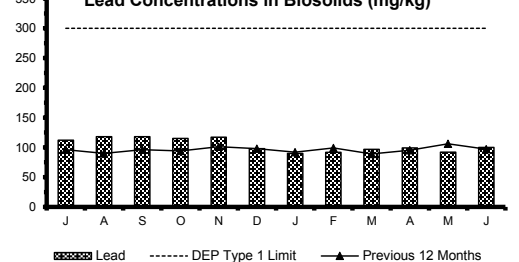
TRAC's annual monitoring and inspection goals are set at the beginning of each fiscal year but they can fluctuate due to the actual number of SIUs. Monitoring of SIUs and Non-SIUs is dynamic for several reasons including: newly permitted facilities, sample site changes within the year requiring a permit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

This accounts for the difference in the goal set for FY18 and the actual number of events monitored and inspected. 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. Adding to this, several new non-SIU permits were issued this year, accounting for differences in the anticipated vs actual events.

Copper Concentrations in Biosolids (mg/kg)



Lead Concentrations in Biosolids (mg/kg)



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.

Copper and lead levels remain relatively constant, below the DEP Type 1 Limit, and within the range of values over the past several years. A discussion of molybdenum concentrations in biosolids is included in the Deer Island Residuals Pellet discussion.

Field Operations Highlights

4th Quarter – FY18

Western Water Operations and Maintenance

Carroll Water Treatment: Staff continued to support the Wachusett Aqueduct Pump Station Project. Staff continued to trouble shoot of the bearing failure and electrical issues with the standby Generator #1, cleared blockages in Soda Ash storage and Dry Feeder #1, and repaired the wiper mechanism in the UV Reactor #11.

Grounds and Aqueducts Maintenance: Staff continued to focus on large numbers of downed trees along easements and at facilities from winter snowstorms. Installed new pipe gates in Wayland to facilitate access by the fire department in the event of a brush fire. Installed interpretive trail signs on the Sudbury Aqueduct as part of the Aqueduct Trails Program.

Metro Water Operations and Maintenance

Valve Program: The 16" and 24" Pressure Reducing Valves (PRVs) at the Deer Island Tank were rebuilt in preparation for the isolation of the tank for painting. Significant staff time was devoted to supporting the various CIP construction contracts with Valve Operations. Staff assisted Bedford with the disinfection of an existing 16" water main, and assisted Revere with the opening of an emergency connection to increase pressure to the Beachmont area. Revere is installing new water mains, and various valve isolations in their system had been causing low pressure issues. Valve Staff provided PRV Training to Swampscott staff to allow them to make adjustments to control the elevation of their water storage tank. Staff deployed the Remotely Operated Vehicle (ROV) to determine valve positions within some of the isolated pipe sections in Brookline's reservoir. MWRA and Revere Staff assisted Malden with an emergency response and isolation of the city's water main, after Malden experienced a water main break on Route 1 June 18 due to a guard rail installation.

Pipeline Staff assisted the Newton with a 20" water main break that occurred on June 1st on Winchester Street. Newton and MWRA Crews worked side by side to cut out and replace the damaged section of pipe. Revere requested the isolation of our Section 55 to assist with determining the source of water entering several basements. The isolation was inconclusive, and the investigative work continues. Leak detection was performed on 45.75 miles of MWRA water main, and community leak assistance was provided to Arlington, Malden, Medford, Milton, Newton, Revere, Saugus, Somerville, and Stoneham.

Operations Engineering

Staff supported the isolations and activations of the below work, including obtaining street opening permits, meeting and coordinating with the affected communities and the development of the isolation and activation operation plans: Blow-Off Retrofits on WASM11B in Arlington and Section 70 in Stoneham; Leak Repairs in Everett, Revere, and Somerville; and

Valve Replacements in Stoneham (3 valves), Shaft 4 in Southborough, and Meter 171 in Arlington.

2018 Community Emergency Response Training Program: Participated in the 2018 Community Emergency Response Training, required by DEP, and provided by MWRA expert staff to local community MWRA staff.

Wastewater Operations & Maintenance

Headworks and Alewife Brook Pump Station Rehabilitation: Operations Staff continues to work with Engineering & Construction Staff and the Contractor on these projects. Staff remotely monitored the operation of the bypass pumping system at Alewife during rain events. Staff also coordinated several HVAC-related outages at the Chelsea Creek Headworks to restore full ventilation to the lower levels of the facility during June.

Planned Utility Power Outage at Prison Point: Eversource had a planned utility power outage for maintenance of their system on June 30th. Prison Point ran on facility generator power during the outage, and a back-up portable generator was brought to the facility, in advance, as a precaution.

Nut Island Isolation Testing: Operations Staff worked with Process Control Staff to develop procedures to test the isolation of Nut Island. The isolation testing is scheduled to take place in August 2018.

Coordination with Wentworth Institute of Technology: Staff continued to coordinate with Wentworth on their construction project which impacted water supply to the Ward Street Facility which needs an uninterrupted supply of water for the odor control wet scrubbers. Work was successfully completed on April 30th.

Metro Equipment & Facility Maintenance

Equipment Maintenance Program: The dewatering pump/motor at the South Boston CSO failed due to moisture intrusion. A spare pump/motor was installed and the unit that failed will be rebuilt and used as a spare. Staff replaced the compressor for Air Conditioning Unit #1 at Nut Island and the Motor for Pumping Unit #1 at the IPS. Infrared electrical thermography testing was conducted at the following facilities: Braintree/ Weymouth, Gillis Pump Station, Spot Pond Pump Station, Hough's Neck and South Boston CSO.

Staff replaced the motor and pulleys for the Air Handling Unit 3 at the Somerville Chemical Building, installed new piping, filters and associated valves, gauges and flowmeters in the S::CAN Room to support filter tests, and repaired the emergency lighting at Columbus Park and Chelsea Creek Headworks.

Field Operations Highlights

4th Quarter – FY18

Staff replaced Air Handler #1 at the DeLauri Pump Station, replaced the coil in Air Handler #1 at the New Neponset Pump Station, and rehabilitated Grit Belt #4 at Nut Island.

Masons installed Flood Barriers in the rear of the Chelsea Maintenance Building, installed flood barriers at Vehicle Maintenance, and pointed entrance wall at the Chelsea Facility.

Metering

Planning: Staff continued to work with contractors on the wastewater meter upgrade project. Staff worked with Verizon reps to begin upgrade of wireless modems to private network to improve security and discussed 4G Migration process. Staff reviewed progress and provided guidance for the construction of new Water Meters 34, 83, 84, 96 and 122.

Community assistance: Staff notified and provided assistance to communities eight separate times when their water use was higher than expected. Staff provided assistance via leak detection and district measurements to Malden.

TRAC

On June 6 and 7, EPA Region 1 completed an Industrial Pretreatment Audit of MWRA's Program; EPA Staff reviewed nine permits during the informal debrief at the end of the second day; EPA reviewed their limited findings, but EPA has not sent a formal summary of their findings.

TRAC issued a total of 55 MWRA 8(m) Permits work within an easement or other property interest held by the Authority. Permits were issued in an average of 75 days from the date the application was received.

Environmental Quality-Water

Algae: Routine reservoir algae and algal toxin monitoring began in May and will continue through September. Results showed neither algal toxins nor taste and odor compounds. Water quality buoy data at all three in-reservoir stations was used to help monitor the algae. Staff finalized a visual inspection checklist for routine cyanobacteria bloom monitoring at the standby reservoirs, and trained Operations staff. Staff attended an EPA Cyanobacteria Monitoring Workshop on June 26th.

Staff collected samples for the Unregulated Contaminant Monitoring Rule 4 (UCMR4) Program in April. This EPA Program monitors for 30 contaminants potentially present in drinking water, but do not have a health-based standard set under the Safe Drinking Water Act.

Water Sampling Group Staff provided community sampler training throughout the quarter for Arlington, Marlborough, Waltham, Wakefield, Weston, Wellesley, Marblehead, Medford, Milton, Quincy, Wilmington.

As part of community emergency response plan training, staff provided a demonstration deployment of the mobile contaminant monitoring system (S::CAN Unit).

Staff worked with Bedford to assess proposed sites for the installation of online chlorine analyzers in Bedford's meter vaults to better monitor water quality changes.

Staff assisted with turbidity testing of samples collected at various locations at the Wachusett Aqueduct Pump Station throughout the months of May and June as part of pump testing activities.

Staff coordinated sampling and testing of reservoir samples at Chestnut Hill throughout May, for algal toxin and enumeration in response to a cyanobacteria bloom.

Staff completed the launch of all three buoys and their sonde equipment on Wachusett Reservoir on May 11th.

Staff assisted Dive Services, Inc. in performing a dive inspection of the intake lines for the Route 12 contaminant monitoring shed on April 30th. The intake lines were found to be intact: all fishing line entanglements and debris were removed and the intake lines were cleaned.

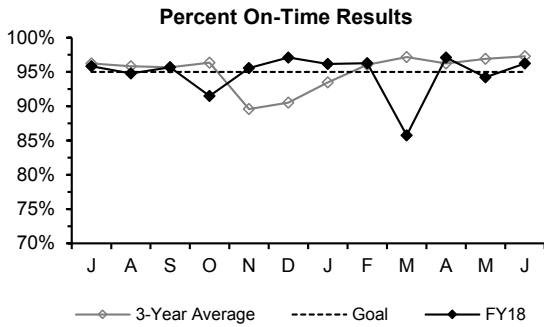
On June 12th, the contaminant monitoring system at CWTP raw water inlet was brought on-line.

Environmental Quality-Wastewater

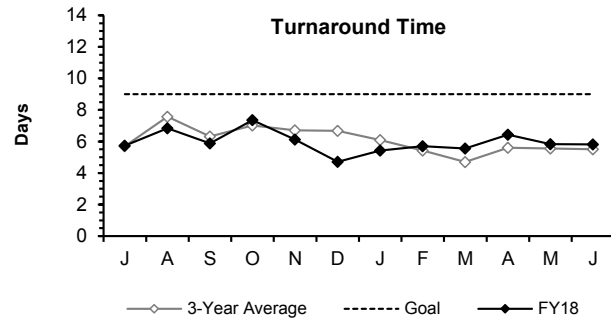
Ambient Monitoring: Water column monitoring continued through the spring, documenting a strong winter-spring phytoplankton bloom in Massachusetts and Cape Cod Bays (a natural phenomenon), and with no indications of red tide in Massachusetts Bay or waters to the north (where red tides originate). The annual Flounder Survey was completed in April and May and the monitoring consultant prepared for the Triennial Mussel Bioaccumulation Study. Staff met with EPA, DEP, and a subset of the Outfall Monitoring Science Advisory Panel to discuss the planned approach to meet permit requirement for water quality modeling, and participated in an Outfall Monitoring Science Advisory Panel Subcommittee setting up a workshop to review the Ambient Monitoring. Preparation of reports on 2017 monitoring results is ongoing.

Harbor/CSO Monitoring: CSO receiving water monitoring in support of the water quality standards variance and the CSO assessment continued, with the full sampling program starting up in April after ice out. Storm sampling was conducted for two storms in the Charles River and three in the Alewife/Mystic. CSO Facility influent samples were collected at the request of Massachusetts DEP at Cottage Farm on April 16th. Biweekly harbor-wide monitoring continued. Beach monitoring data are being posted to the web site weekly beginning Memorial Day through June (and then daily through Labor Day).

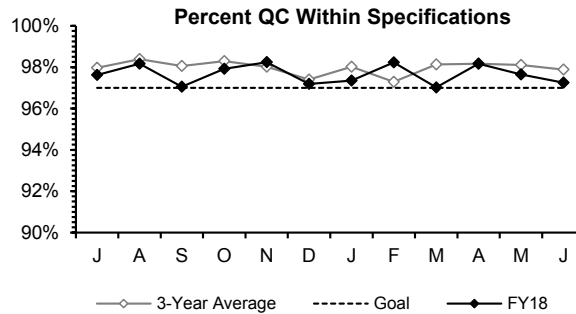
Laboratory Services 4th Quarter - FY18



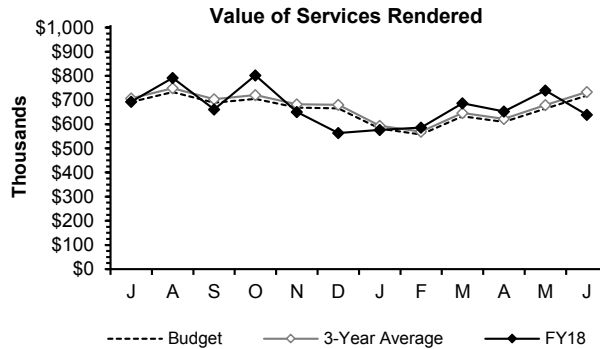
The Percent On-Time measurement was above the 95% goal two of the three months of the quarter. All regulatory reporting deadlines were met.



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



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



Value of Services Rendered was above the seasonally adjusted budget projection two of the three months of the quarter. We were above the budget projection for the fiscal year.

Highlights:

Dr. Delaney and Mr. Blodgett published two articles on cyanide: "Is there cyanide in my drinking water" in the Association of Public Health Laboratories "Lab Matters" newsletter and "Avoiding fake cyanide in wastewater testing" in the National Environmental Laboratory Accreditation Conference newsletter.

Quality Assurance:

Microbiologists from the Indigo Team participated in an audit by the Division of Marine Fisheries against FDA requirements for our testing of Mass Bay samples for fecal coliform bacteria to show that DITP isn't adversely affecting shellfishing. There were no adverse findings. Obtained DEP certification for the revised trace organics methods that were part of EPA's Methods Update Rule for wastewater testing. This is needed for TRAC and NPDES testing. Also, we completed our Proficiency Test (PT) requirements for 2018, which are required to maintain our DEP certification for 2018. Overall we got passing results for 540 out of 545 (99.1%) chemistry and microbiology parameters. The few parameters not passed on the first try were successfully passed on the second try.

Clinton:

A special study of the mass balance of copper, iron, and phosphorus in the Clinton Treatment Plant was completed.

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.

Mobile Lab:

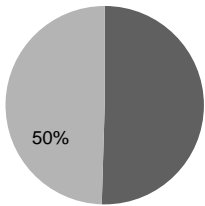
A successful drill of the Mobile Lab instruments was conducted by Lab staff at Norembega Covered Storage.

CONSTRUCTION PROGRAMS

Projects In Construction

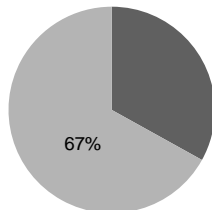
4th Quarter - FY18

Money



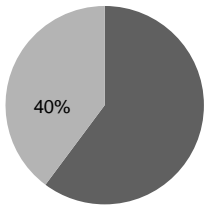
■ Amount Remaining
■ Billed to Date

Time



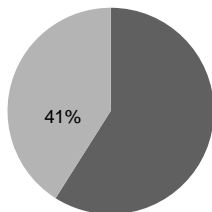
■ Days Remaining
■ Days Expended

Money



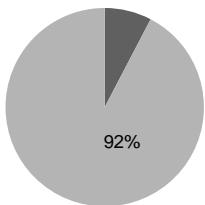
■ Amount Remaining
■ Billed to Date

Time



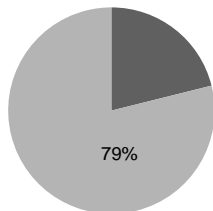
■ Days Remaining
■ Days Expended

Money



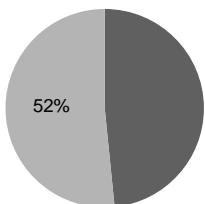
■ Amount Remaining
■ Billed to Date

Time



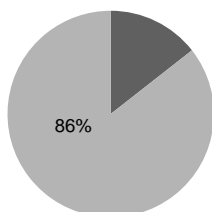
■ Days Remaining
■ Days Expended

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: Cleaned/CCTV inspected 1,414 linear feet of cured-in-place pipe lining installed in 1991. Installed approximately 717 linear feet of cured-in-place pipe liner; replaced frame and cover at manhole 74/16+90.

Chelsea Creek Headworks Upgrade

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

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

Status and Issues: As of June, the Contractor excavated and removed material for the odor control foundation; excavated and graded trenches for odor control duct pedestal foundations. In addition, they installed a temporary bulkhead at the Channel 1 Effluent end, cut and chipped concrete for the new stop log guide frames for the Channel 1 effluent end.

Wachusett Aqueduct Pumping Station

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

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

Status and Issues: As of June, the Contractor installed slide gate aluminum covers. They flushed and filled wells #1 through #7 with water from the Wachusett Aqueduct for pump testing. They continued work on the plumbing pipe, light fixtures, duct work, pipe insulation & electrical conduit, wiring, tank and equipment installation.

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.

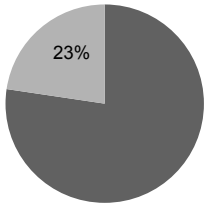
Notice to Proceed: 29-Jan-2016 *Contract Completion:* 27-Nov-2018

Status and Issues: As of June, the Contractor installed Pumps 1 and 3. They also installed the discharge piping, check valves and knife gates for Pumps 1, 2, and 3. They installed pump motor mounts, gear drive reducers and motors, drive shafts and guards for Pumps 1, 2, and 3.

Projects In Construction

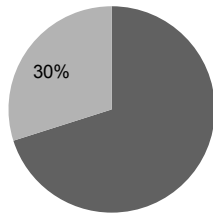
4th Quarter - FY18

Money



■ Amount Remaining
■ Billed to Date

Time



■ Days Remaining
■ Days Expended

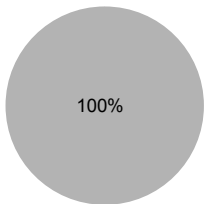
NIH Section 110 - Stoneham

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

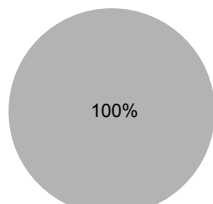
Status and Issues: As of June, the Contractor installed of 725-LF of 48" DIP water main along Woodland Road (DCR), Main Street and Wright Street. They constructed temporary water bypass along Wright Street and a local water main at Wright/Gilmore intersection.

Money



■ Amount Remaining
■ Billed to Date

Time



■ Days Remaining
■ Days Expended

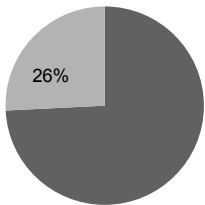
DITP Valves and Piping Replacements

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

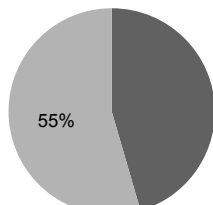
Status and Issues: The Contactor has demobilized and has completed all punchlist items. The final paperwork is being processed.

Money



■ Amount Remaining
■ Billed to Date

Time



■ Days Remaining
■ Days Expended

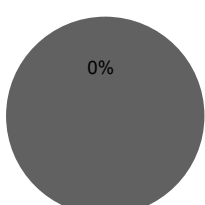
Winthrop Terminal VFD and Motor

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

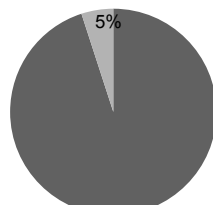
Status and Issues: VFD No. 6 operational testing on-going. VFD/Motor No. 2 string test TBA.

Money



■ Amount Remaining
■ Billed to Date

Time



■ Days Remaining
■ Days Expended

Gravity Thickener Rehabilitation

Project Summary: This project involves the upgrade of all six gravity thickeners, including the complete replacement of each tank's sludge and scum thickening equipment and 5 of the 6 FRP dome covers.

Notice to Proceed: 11-May-2018 *Contract Completion:* 4-Feb-2021

Status and Issues: NTP issued May 11, 2018. To date no physical work has begun.

CSO CONTROL PROGRAM
4th Quarter – FY18

All 35 projects in the Long-Term CSO Control Plan are complete, in compliance with Schedule Seven. Of the \$910.1 million budget in the FY19 CIP for the CSO Control Program, approximately \$7 million remain to be spent through 2021.

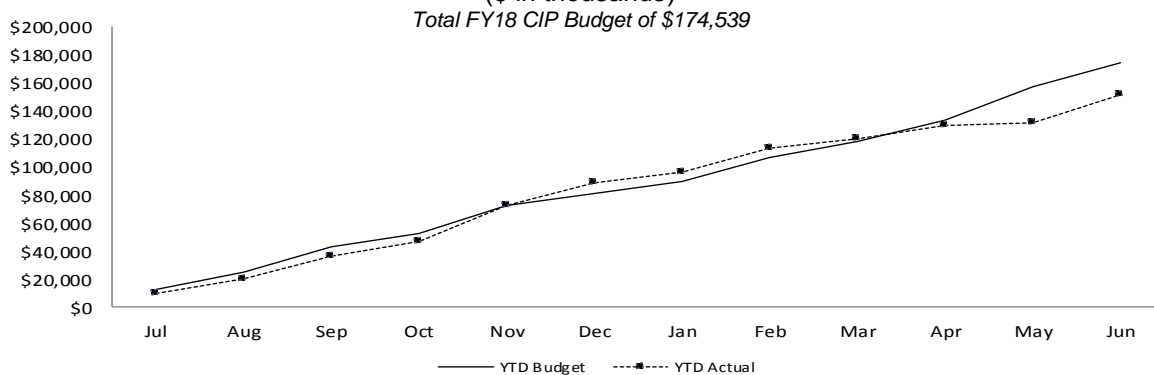
Project/Item	Status as of June 30, 2018
BWSC Dorchester Interceptor Inflow Removal	<p>MWRA's CIP and the MOU/FAA with BWSC included \$5.4 million for additional inflow removal from the BWSC Dorchester Interceptor system in the South Dorchester Bay Sewer Separation area, of which \$1.7 million was transferred 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 MWRA financial assistance to reimbursement of the eligible costs of BWSC construction work reviewed and approved by MWRA, up to \$3.8 million. BWSC continues to perform sewer system evaluations that will support construction project recommendations.</p>
City of Cambridge Memorandum of Understanding and Financial Assistance Agreement	<p>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 through June 30, 2018, when the 22 year-old, \$100.2 million MOU/FAA ended. Cambridge continues to support ongoing MWRA final eligibility reviews and final reconciliation of the MOU/FAA costs.</p>
MWRA CSO Performance Assessment	<p>MWRA issued the Notice to Proceed with the contract for CSO Post-Construction Monitoring and Performance Assessment to AECOM Technical Services, Inc., in November 2017. The contract includes CSO inspections, overflow metering, hydraulic modeling, system performance assessments and water quality compliance assessments culminating in the submission of a report verifying attainment of court-ordered levels of CSO control to EPA and DEP in December 2020, in compliance with the last milestone in Schedule Seven. AECOM completed the inspection of more than 200 CSO closed or active regulators and the installation of temporary overflow meters at 58 potentially active regulators by April 15, and has been collecting data from the temporary meters, from permanent MWRA and community meters, and from a network of rain gauges. AECOM is updating MWRA's collection system model with the inspection results, and will submit a first semi-annual report this fall that will document and evaluate the meter, rain gauge and model results for storms during April-June 2018. MWRA staff continue to conduct water quality sampling in Alewife Brook, the Charles River Basin and other waters affected by CSO. MWRA will submit a draft water quality analysis plan to DEP by July 31. The analysis plan will document how AECOM will analyze the water quality data to measure remaining CSO impacts and compare to the recommended CSO control plan predictions.</p>

CIP Expenditures 4th Quarter - FY18

FY18 Capital Improvement Program Expenditure Variances through June by Program (\$ in thousands)				
Program	FY18 Budget Through June	FY18 Actual Through June	Variance Amount	Variance Percent
Wastewater	84,286	65,252	(19,034)	-23%
Waterworks	82,731	83,025	\$294	0%
Business and Operations Support	7,522	3,247	(4,275)	-57%
Total	\$174,539	\$151,524	(\$23,015)	-13%

Project underspending within Wastewater was due to less than budgeted community requests for I/I grants and loans, channel #1 work delays due to water main and fuel storage installations for the Chelsea Creek Headworks Upgrades Construction, construction delays related to bypass pumping for the Alewife Brook Pump Station Construction, Reading Extension Sewer lining issues, delay in award for the Deer Island Chemical Bulk Storage Tanks Relining, Residuals Mechanical and Electrical Improvements, Pump Station and CSO Condition Assessment, Clinton Roofing Rehabilitation, and Combined Heat and Power Energy Alternatives Study contracts, testing delays for the Clinton Phosphorus Reduction contract, as well as work at Deer Island anticipated for FY18 that was completed in FY17 for the Digester Sludge Pump Replacement Construction Phase 2, and lower award than budgeted for the Wastewater Metering, Study and Design contract. This was partially offset by progress on Gravity Thickener Rehabilitation, Chelsea Creek Headworks Upgrades Design/ESDC and CSO Performance Assessment. Project overspending in Waterworks was due to construction progress for the Wachusett Pump Station Construction, Southern Extra High Section 111 Construction 1 and 2, Northern Intermediate High Phases 2, 1B, and 1C, Marlborough Maintenance Facility, timing of watershed land purchases, and progress on boring work for the Weston Aqueduct Supply Mains Design/MEPA/REI contract. This was partially offset by underspending due to delay in awards for Southern Extra High Redundancy Section 111 Construction 3 and Section 53 and 99 Connections Design CA/RI, Shaft 12 Isolation Gate Design contract being terminated, and updated schedules for Carroll Water Treatment Plant SCADA and Quabbin Aqueduct and Winsor Power Station Final Design/CA/RI contracts.

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



Construction Fund Management

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

Cash Balance as of 6/30/2018	\$105.6 million
Unused capacity under the debt cap:	\$1.338 billion
Estimated date for exhausting construction fund without new borrowing:	MAY-19
Estimated date for debt cap increase to support new borrowing:	Not anticipated at this time
Commercial paper/Revolving loan outstanding:	\$128 million
Commercial paper capacity / 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

4th 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 raw water tap before being treated and entering the CVA system.

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

Sample Site: Wachusett Reservoir

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

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

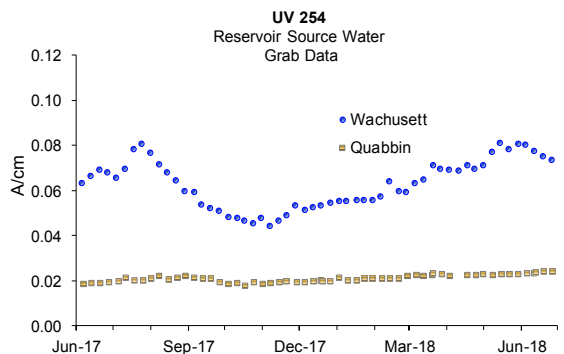
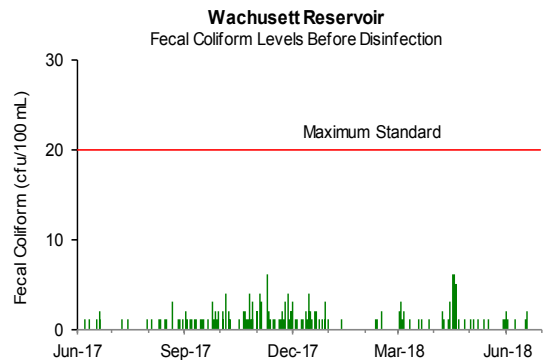
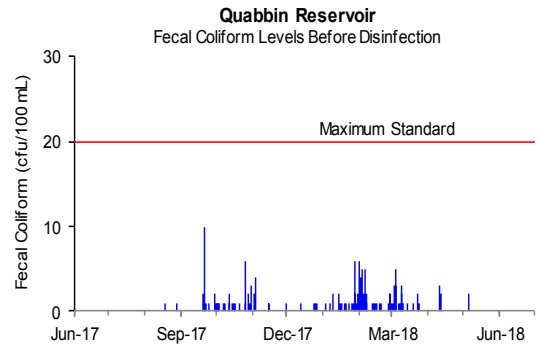
All samples collected during the 4th Quarter were below 20 cfu/100ml. **For the current six-month period, 0.0% of the samples exceeded a count of 20 cfu/100mL.**

Source Water – UV Absorbance

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

Quabbin Reservoir UV-254 levels are currently around 0.024 A/cm.

Wachusett Reservoir UV-254 levels are currently around 0.074 A/cm.



Source Water – Turbidity

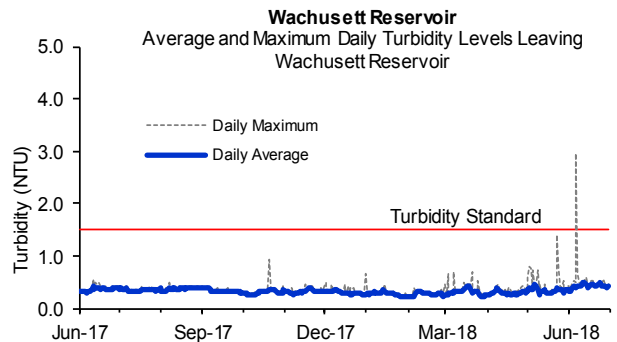
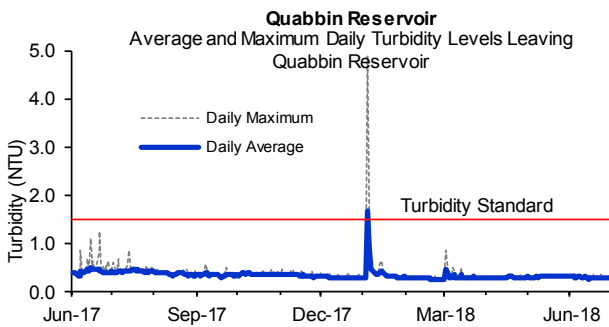
4th Quarter – FY18

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 were within DEP standards for the quarter. Maximum turbidity results at Wachusett were within DEP standards for April and May.

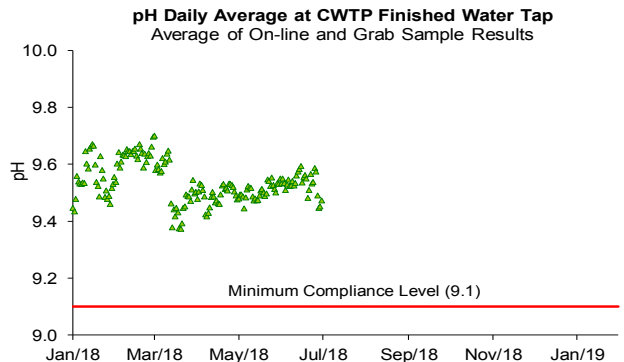
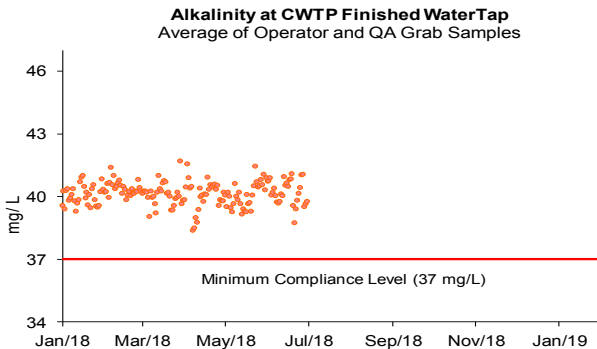
- On June 6 at 9:00AM, a 15-minute turbidity spike of 2.9 NTU was caused by pump tests at the Wachusett Aqueduct Pump Station. The pumps were shutdown at 9:05AM as soon as the increase in turbidity was detected at the CWTP inlet. Disinfection effectiveness was not affected; CT was maintained at all times, downstream disinfectant residuals were maintained, and no coliform were detected in downstream samples. Regulatory compliance was maintained.



Treated Water – pH and Alkalinity Compliance

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

Each CVA community provides its own corrosion control treatment. See the CVA report: www.mwra.com/water/html/awqr.htm. Distribution system samples were collected on June 13 and 14, 2018. Distribution system sample pH ranged from 9.4 to 9.6 and alkalinity ranged from 39 to 40 mg/L. No sample results were below DEP limits for this quarter.



Treated Water – Disinfection Effectiveness

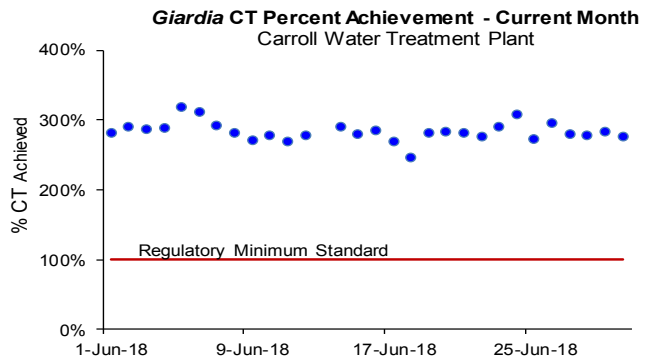
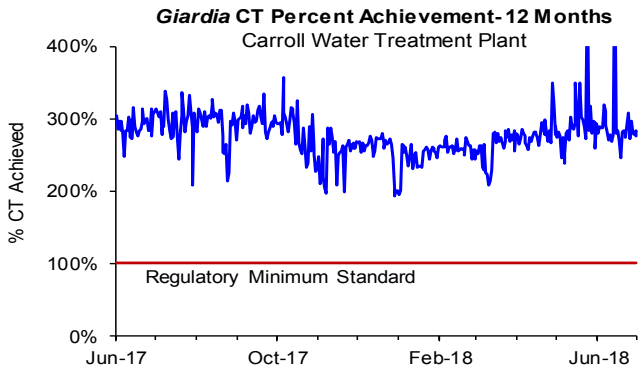
4th Quarter – FY18

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.

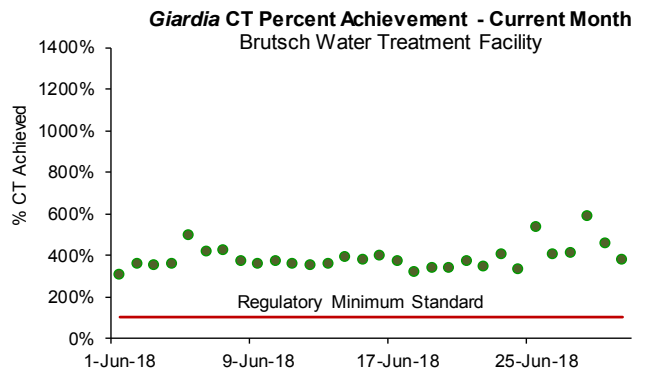
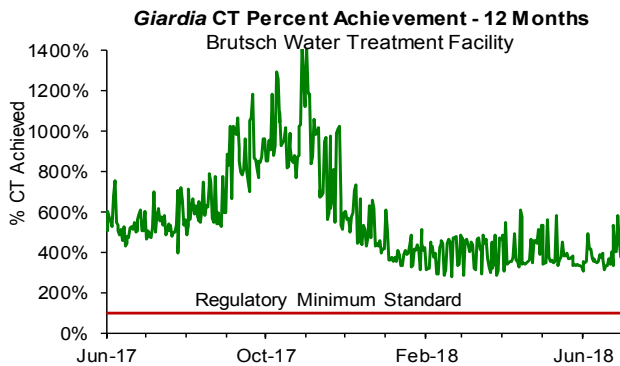
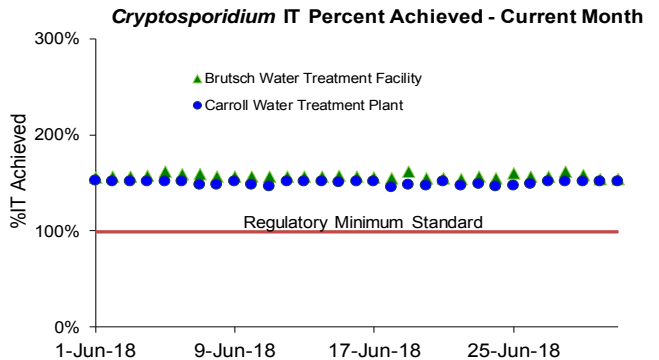
Wachusett Reservoir – MetroWest/Metro Boston Supply:

- Ozone dose at the CWTP varied between 2.1 to 2.9 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 1.7 mg/L for the quarter.
- Giardia* CT was maintained above 100% at all times the plant was providing water into the distribution system for the quarter.
- Cryptosporidium* IT was maintained above 100% during the month. Off-spec water was less than 5%.



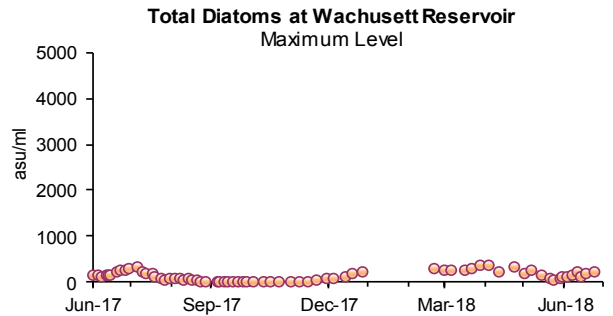
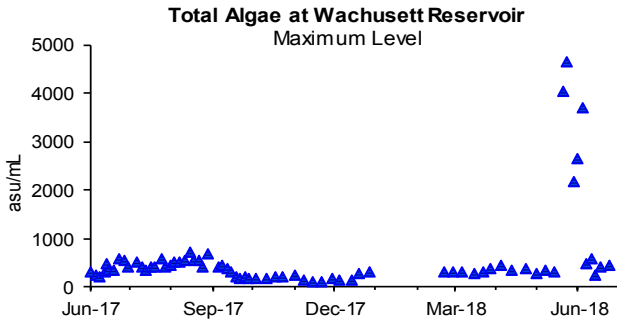
Source Water - Algae

4th Quarter – 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 4th Quarter, no complaints which may be related to algae were reported from the local water departments.



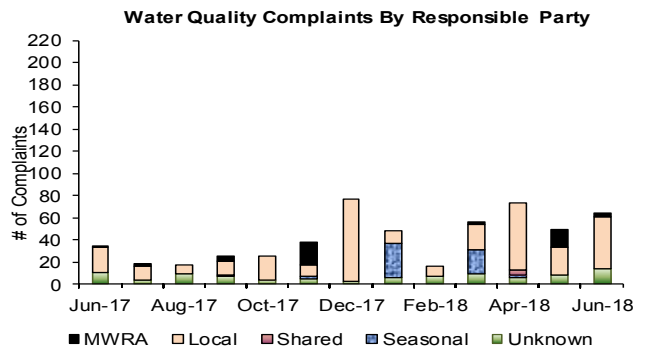
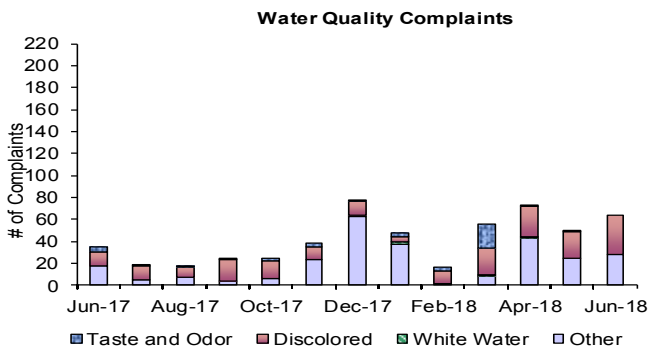
Drinking Water Quality Customer Complaints: Taste, Odor, or Appearance

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

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

Communities reported 187 complaints during the quarter compared to 125 complaints from 4th Quarter of FY17. Of these complaints, 88 were for "discolored water", 2 were for "taste and odor", 1 was for "white water", and 96 were for "other". Of these complaints, 132 were local community issues, 20 were MWRA related, 5 were community and MWRA shared issues, 2 were seasonal in nature, and 28 were unknown in origin.

- On April 18, Arlington reported twenty-five "no water" complaints when a section of a water main on Lake Street was isolated due to local construction work.
- On May 3, Malden reported sixteen "no water" complaints when an MWRA contractor struck a water main at Pleasant Street and Commercial Street.
- On June 1, Newton reported fourteen "no water" complaints due to a water main break on Winchester Street.



Bacteria & Chlorine Residual Results for Communities in MWRA Testing Program

4th 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.

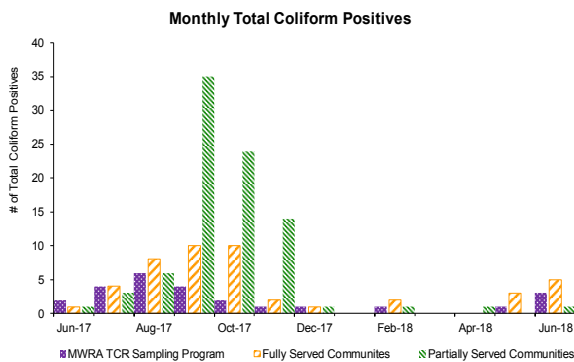
A disinfectant residual is intended to maintain the sanitary integrity of the water; MWRA considers a residual of 0.2 mg/L a minimum target level at all points in the distribution system.

Highlights

In the 4th Quarter, 10 of the 6,246 community samples (0.16% system-wide) submitted to MWRA labs for analysis tested positive for total coliform. (Marlborough - April; Everett, Stoneham, Watertown – May; Malden, Milton, Newton, Northborough, Somerville, Bedford – June) Four of the 1,982 Shared community/MWRA samples (0.20%) tested positive for total coliform. One Shared community/MWRA sample (Stoneham, May 27) tested positive for *E.coli*, but all repeat samples were clear. At the end of the 4th Quarter, only 0.4% of the samples had a chlorine residual lower than 0.2 mg/L. No community violated the TCR. As of June 20, 2018, Westborough State Hospital is now on town water supplied by Westborough.

NOTES:

- MWRA total coliform and chlorine residual results include data from community locations. In most cases these community results are indicative of MWRA water as it enters the community system; however, some are strongly influenced by local pipe conditions. Residuals in the MWRA system are typically between 1.0 and 2.8 mg/L.
- The number of samples collected depends on the population served and the number of repeat samples required.
- These communities are partially supplied, and may mix their chlorinated supply with MWRA chloraminated supply.
- Part of the Chicopee Valley Aqueduct System. Free chlorine system.



	Total Coliform # Samples (b)	# (%) Positive	E.coli # Positive	Assessment Required
a				
MWRA Locations	389	0 (0%)	0	
Shared Community/MWRA sites	1593	4 (0.25%)	0	
Total: MWRA	1982	4 (0.20%)	0	No
ARLINGTON	157	0 (0%)	0	
BELMONT	114	0 (0%)	0	
BOSTON	795	0 (0%)	0	
BROOKLINE	224	0 (0%)	0	
CHELSEA	169	0 (0%)	0	
DEER ISLAND	52	0 (0%)	0	
EVERETT	172	1 (0.58%)	0	No
FRAMINGHAM	234	0 (0%)	0	
LEXINGTON	117	0 (0%)	0	
LYNNFIELD	18	0 (0%)	0	
MALDEN	237	0 (0%)	0	
MARBLEHEAD	72	1 (0.42%)	0	No
MEDFORD	221	0 (0%)	0	
MELROSE	117	0 (0%)	0	
MILTON	105	1 (0.95%)	0	No
NAHANT	30	0 (0%)	0	
NEWTON	279	1 (0.36%)	0	No
NORTHBOROUGH	51	1 (1.96%)	0	No
NORWOOD	99	0 (0%)	0	
QUINCY	299	0 (0%)	0	
READING	130	0 (0%)	0	
REVERE	180	0 (0%)	0	
SAUGUS	104	0 (0%)	0	
SOMERVILLE	275	1 (0.36%)	0	No
SOUTHBOROUGH	30	0 (0%)	0	
STONEHAM	94	1 (1.06%)	1	No
SWAMPSCOTT	54	0 (0%)	0	
WALTHAM	216	0 (0%)	0	
WATERTOWN	133	1 (0.75%)	0	No
WESTBORO HOSPITAL	10	0 (0%)	0	
WESTON	45	0 (0%)	0	
WINTHROP	72	0 (0%)	0	
Total: Fully Served	4895	8 (0.16%)		
c				
BEDFORD	60	1 (1.67%)	0	No
CANTON	90	0 (0%)	0	
HANSCOM AFB	33	0 (0%)	0	
MARLBOROUGH	130	1 (0.77%)	0	No
NEEDHAM	123	0 (0%)	0	
PEABODY	221	0 (0%)	0	
WAKEFIELD	147	0 (0%)	0	
WELLESLEY	114	0 (0%)	0	
WILMINGTON	87	0 (0%)	0	
WINCHESTER	91	0 (0%)	0	
WOBURN	195	0 (0%)	0	
SOUTH HADLEY FD1	60	0 (0%)	0	
Total: CVA & Partially Served	1351	2 (0.15%)		
Total: Community Samples	6246	10 (0.16%)		

Chlorine Residuals in Fully Served Communities

	2017							2018					
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
% <0.1	0.1	0.2	0.9	1.0	0.7	0.7	0.5	0.2	0.1	0.1	0.0	0.2	0.0
% <0.2	0.2	0.7	2.7	2.6	2.4	2.5	1.1	0.5	0.2	0.2	0.3	0.2	0.4
% <0.5	0.6	3.2	5.7	6.2	5.6	5.7	3.1	1.4	0.5	0.8	0.7	0.4	0.7
% <1.0	1.9	6.7	12.3	10.5	9.4	9.6	6.0	3.2	2.2	1.4	1.5	1.3	1.6
% ≥1.0	98.1	93.3	87.7	89.5	90.6	90.4	94.0	96.8	97.9	98.6	98.5	98.7	98.4

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

4th 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.

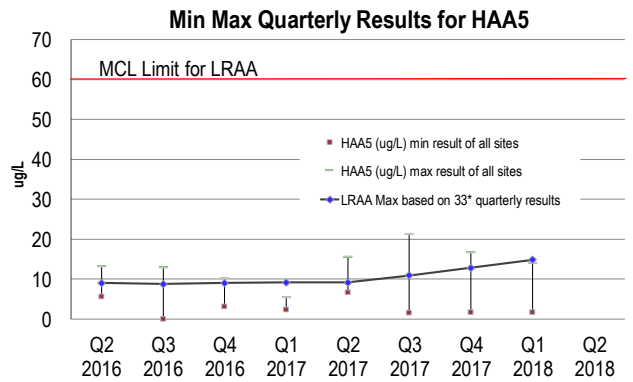
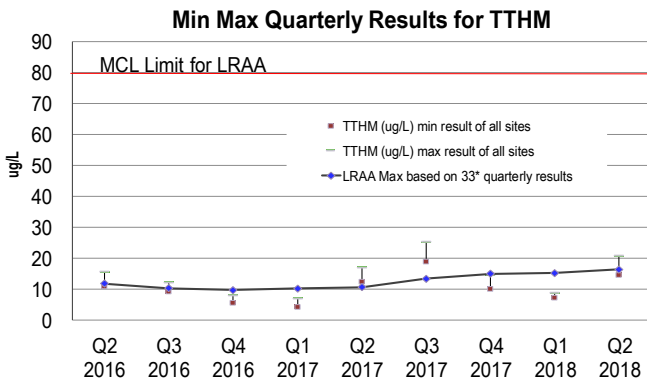
Partially served and CVA communities are responsible for their own compliance monitoring and reporting, and must be contacted directly for their individual results. The chart below combines all three CVA communities data (Chicopee, Wilbraham and South Hadley FD1).

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.

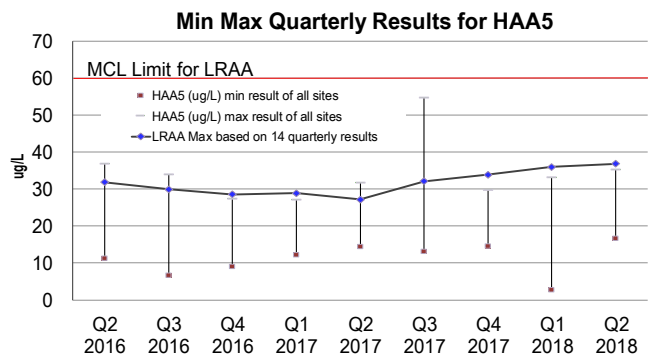
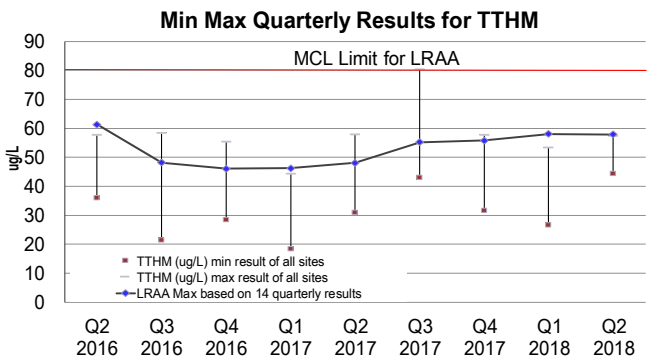
The LRAA for TTHMs and HAA5s for MWRA's Compliance Program (represented as the line in the top two graphs below) remain below current standards. The Max LRAA in the quarter for TTHMs = 16.4 µg/L; HAA5s = 14.8 µg/L. The current RAA for Bromate = 0.0 µg/L. CVA's DBP levels continue to be below current standards.

A quarterly DBP location in Northborough* was added to MWRA's Compliance Program in Q2, 2018. Samples for the MetroBoston communities were collected in May, but resampling of some locations was necessary due to a contract laboratory QA/QC failure resampling has occurred.

MetroBoston Disinfection By-Products



CVA Disinfection By-Products (Combined Results)



Water Supply and Source Water Management

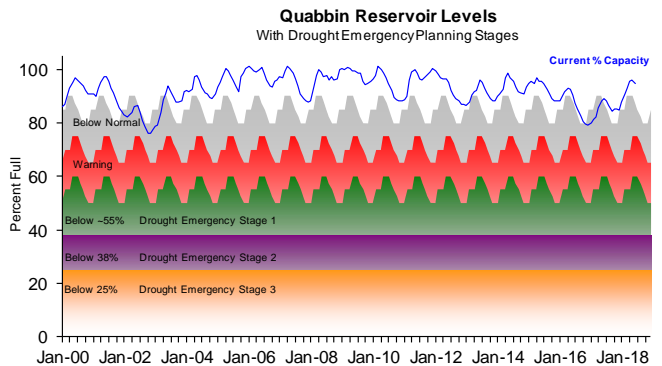
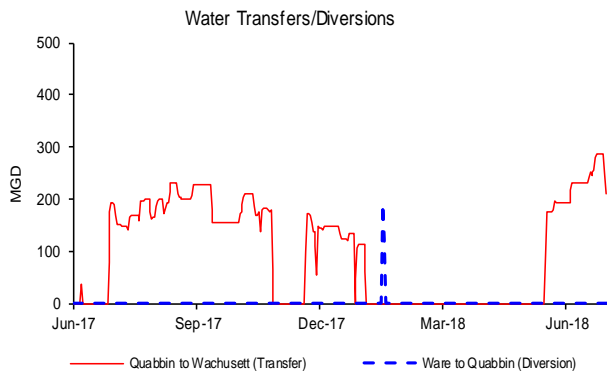
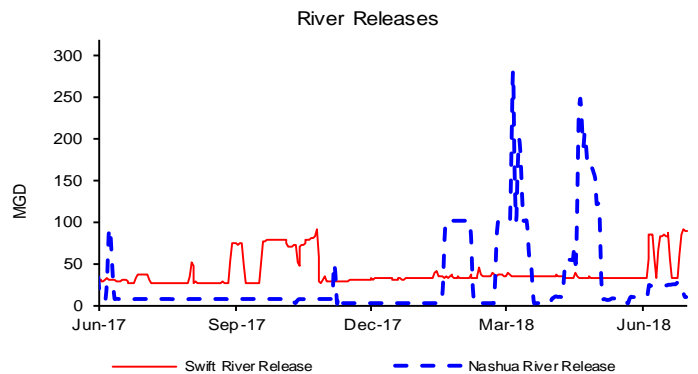
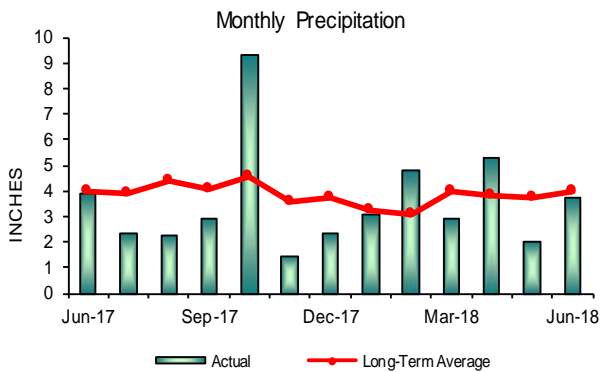
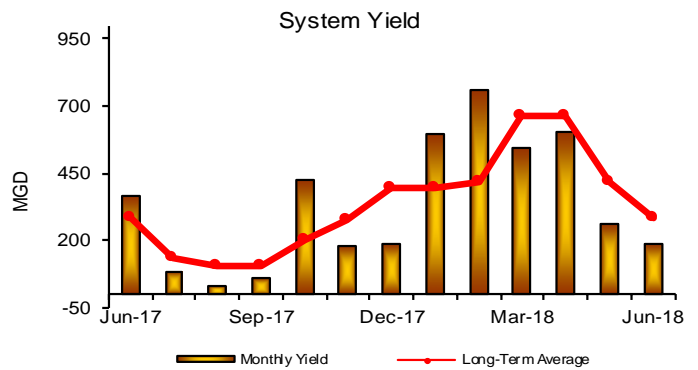
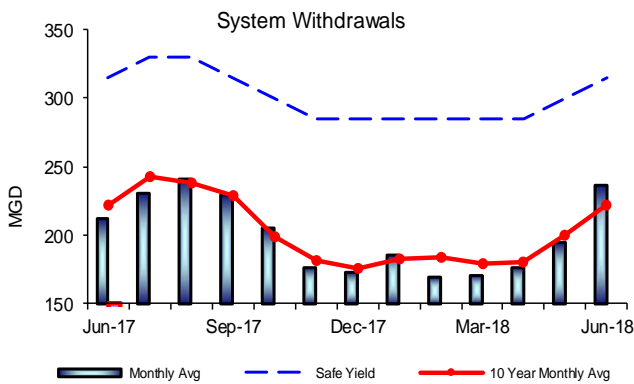
4th Quarter – FY18

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 94.5% as of June 30, 2018; a 1.6% increase for the quarter, which represents a gain of more than 6.6 billion gallons of storage and an increase in elevation of 0.88' for the quarter. Quabbin level is in "normal" operating range. Precipitation and yield for the quarter were below their respective long term averages. System withdrawal for the quarter was below the 10 year monthly average.



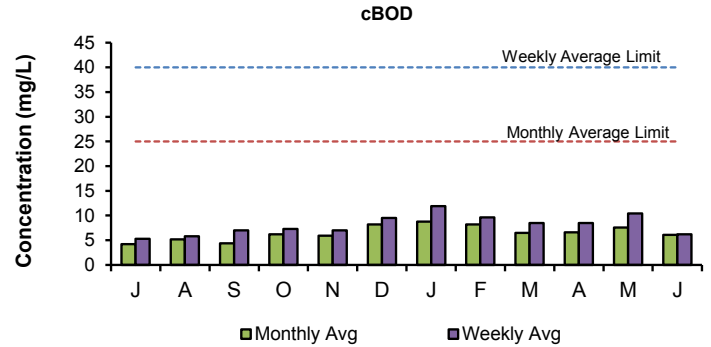
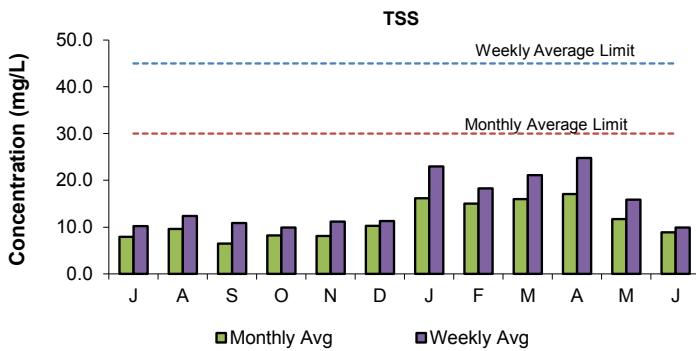
WASTEWATER QUALITY

NPDES Permit Compliance: Deer Island Treatment Plant 4th Quarter - FY18

NPDES Permit Limits

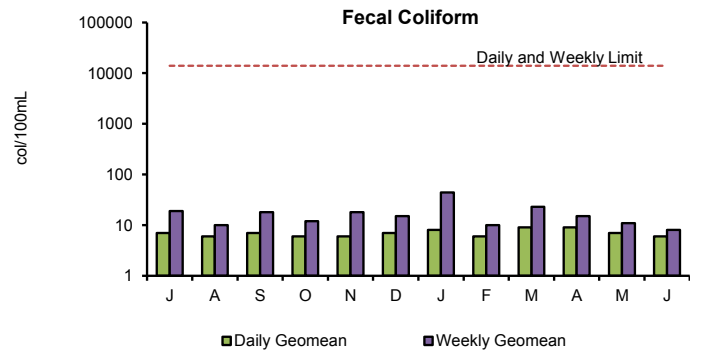
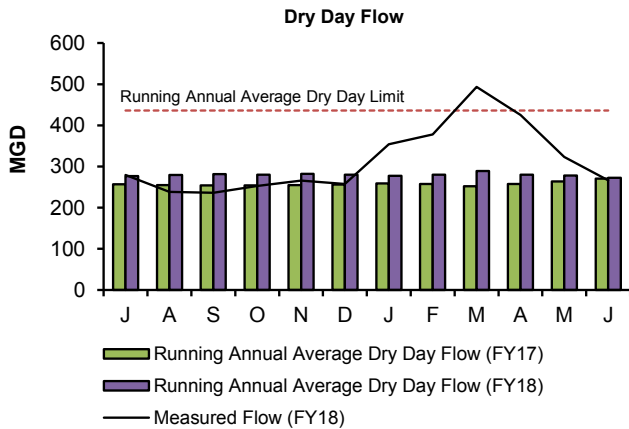
Effluent Characteristics		Units	Limits	April	May	June	4th Quarter Violations	FY18 YTD Violations
Dry Day Flow (365 Day Average):		mgd	436	279.9	278.3	272.7	0	0
cBOD:	Monthly Average	mg/L	25	6.6	7.6	6.1	0	0
	Weekly Average	mg/L	40	8.5	10.4	6.2	0	0
TSS:	Monthly Average	mg/L	30	17.1	11.7	8.9	0	0
	Weekly Average	mg/L	45	24.8	15.9	9.9	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	9	7	6	0	0
	Weekly Geometric Mean	col/100mL	14000	15	11	8	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	6.3-6.9	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	100	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 4th 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 4th Quarter were within permit limits.



Running Annual Average Dry Day Flow is the average of all dry weather influent flows over the previous 365 days. The Dry Day Flow for the 4th 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 4th Quarter, all permit conditions for fecal coliform were met.

NPDES Permit Compliance: Clinton Wastewater Treatment Plant 4th Quarter - FY18

NPDES Permit Limits

Effluent Characteristics		Units	Limits	April	May	June	4th Quarter Violations	FY18 YTD Violations
Flow:		mgd	3.01	2.59	2.56	2.50	0	0
BOD:	Monthly Average:	mg/L	20	1.3	2.0	1.8	0	0
	Weekly Average:	mg/L	20	1.7	2.6	2.3	0	0
TSS:	Monthly Average:	mg/L	20	5.1	4.3	4.1	0	0
	Weekly Average:	mg/L	20	6.0	4.9	4.7	0	0
pH:		SU	6.5-8.3	6.8-7.3	6.9-7.7	6.8-7.5	0	0
Dissolved Oxygen:		mg/L	6	10.2	9.0	7.7	0	0
E. Coli:	Monthly Geometric Mean:	cfu/100mL	126	5.0	5.0	6.8	0	0
	Daily Geometric Mean:	cfu/100mL	409	7.0	7.0	34.4	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	11.3	8.9	11.3	0	0
	Daily Maximum:	ug/L	14.0	11.3	8.9	11.6	0	0
Total Ammonia Nitrogen: June 1st - October 31st	Monthly Average:	mg/L	2.0	0.28	0.00	0.14	0	0
	Daily Maximum:	mg/L	3.0	0.58	0.00	0.87	0	0
Total Phosphorus: April 1st - October 31st	Monthly Average:	mg/L	1.0*	0.07	0.18	0.10	0	0
	Daily Maximum:	mg/L	RPT*	0.14	0.36	0.17	0	0
Acute Toxicity*:		%	≥100	N/A	N/A	>100	0	0
Chronic Toxicity*:		%	≥62.5	N/A	N/A	62.5	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.

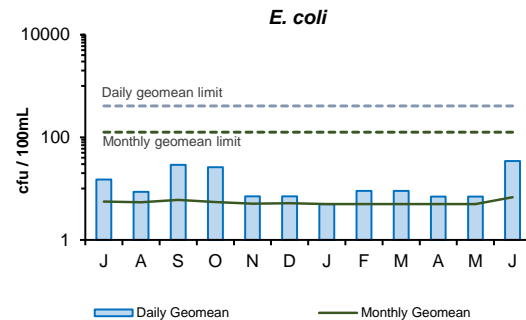
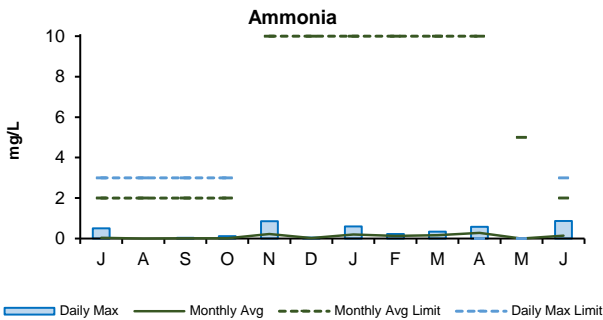
2nd Quarter: There were no permit violations in the second quarter.

3rd Quarter: There were no permit violations in the third quarter.

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

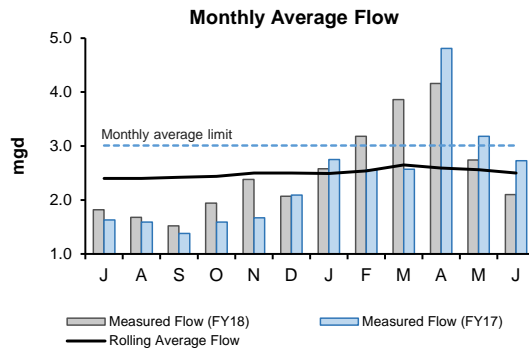
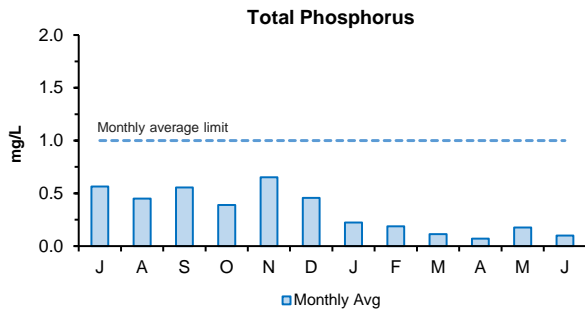
* The growing season (April 1 - October 31) monthly average phosphorus limit of 0.15 mg/L goes into effect April 1, 2019

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



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

E. coli is an indicator for the possible presence of pathogens. There were no violations of permit limits in the 4th Quarter. The monthly and daily limits are 126 cfu/100 mL and 409 cfu/100 mL respectively.

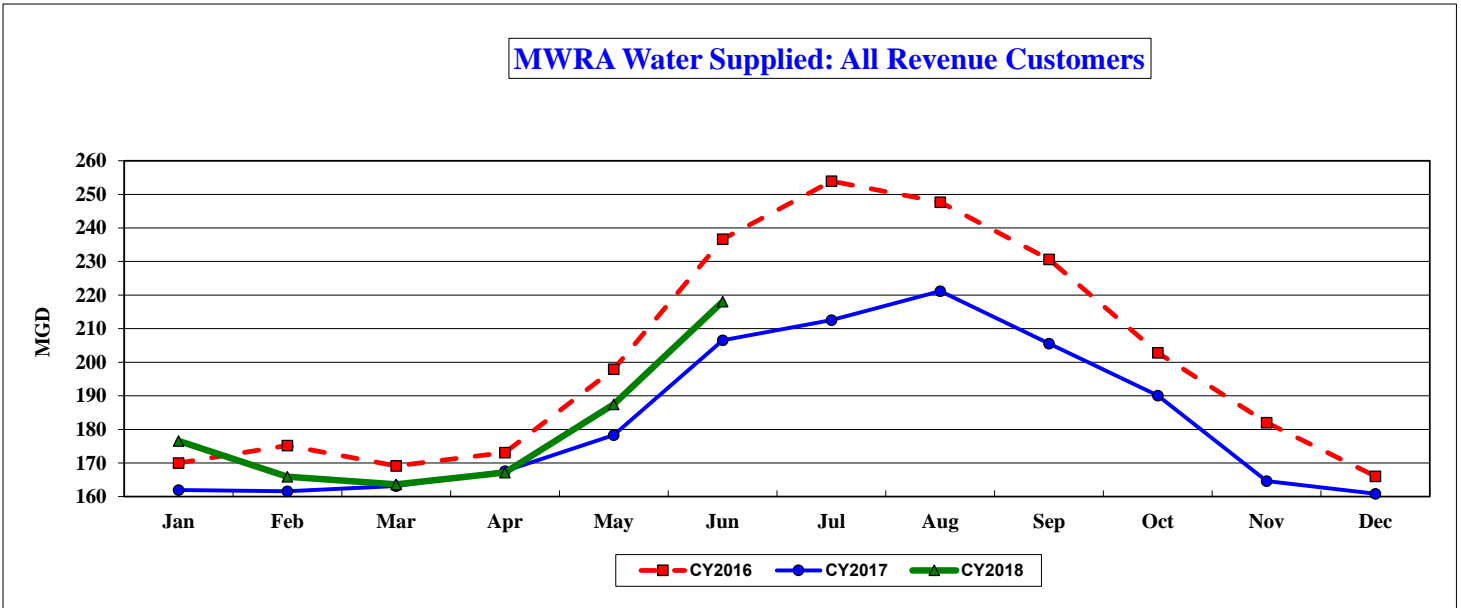


The 4th Quarter's monthly average concentrations for total phosphorus were below permit limits. An interim permit limit of 1.0 mg/L is in effect from April through October, until April 1st, 2019, when the new permit limit of 0.15 mg/L goes into effect for April - October. The new permit limit of 1.0 mg/L from November through March goes into effect November 1st, 2019.

The graph depicts the rolling annual average monthly flow, measured in million gallons per day, exiting the plant. The average monthly flows during the 4th Quarter were below the NPDES permit limit.

COMMUNITY FLOWS AND PROGRAMS

Total Water Use 4th Quarter - FY18



MGD	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD Average	Annual Average
CY2016	169.99	175.23	169.16	173.08	197.94	236.64	253.92	247.68	230.63	202.83	182.02	166.06	186.94	200.51
CY2017	161.94	161.61	163.13	167.61	178.33	206.54	212.53	221.18	205.58	190.05	164.61	160.85	173.23	182.97
CY2018	176.60	165.89	163.63	167.16	187.49	218.05	0.00	0.00	0.00	0.00	0.00	0.00	179.89	179.89

MG	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD Total	Annual Total
CY2016	5269.65	5081.63	5244.00	5192.41	6136.13	7099.33	7871.62	7678.12	6918.94	6287.65	5460.60	5147.83	34023.15	73387.92
CY2017	5020.18	4525.06	5057.00	5028.39	5528.26	6196.22	6588.51	6856.43	6167.36	5891.64	4938.30	4986.43	31355.10	66783.78
CY2018	5474.61	4644.94	5072.61	5014.75	5812.14	6541.36	0.00	0.00	0.00	0.00	0.00	0.00	32560.42	32560.42

The June 2018 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 2018 water use will be used to allocate the FY20 water utility rate revenue requirement. June 2018 water supplied of 218.0 mgd (for revenue generating users) is up 11.5 mgd or 5.6% compared to June 2017. System-wide year to date consumption for CY18 is higher than CY17 with 179.9 mgd being supplied to MWRA customers through June. This is 6.7 mgd higher than CY17, and is an increase of 3.8%. June 2018 water supplied of 218.0 mgd (for revenue generating users) is up 11.5 mgd or 5.6% compared to June 2017.

System-wide year to date consumption for CY18 is higher than CY17 with 179.9 mgd being supplied to MWRA customers through June. This is 6.7 mgd higher than CY17, and is an increase of 3.8%, and 7.05mgd less than CY16, a decrease of 3.8%.

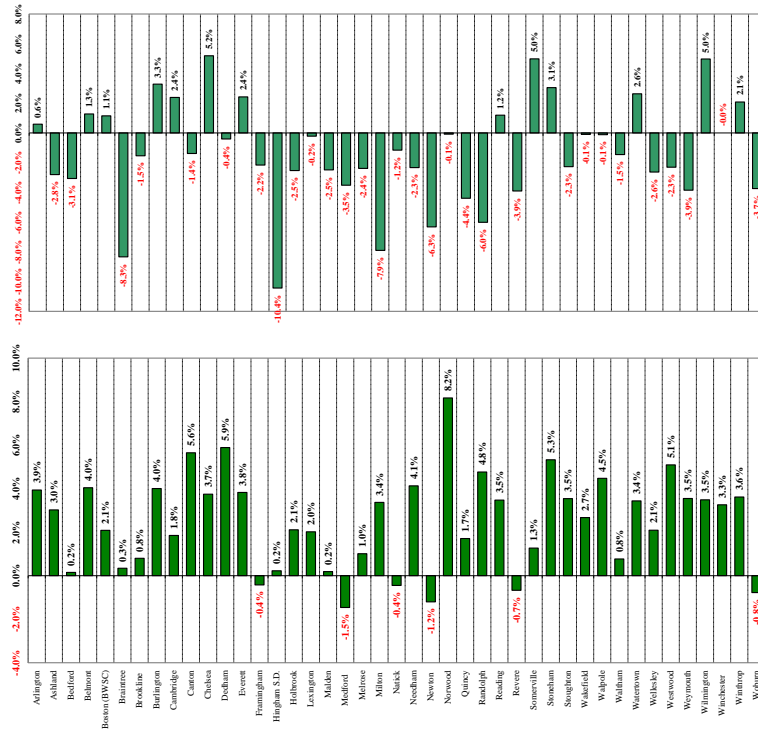
Community Wastewater Flows

4th Quarter - FY18

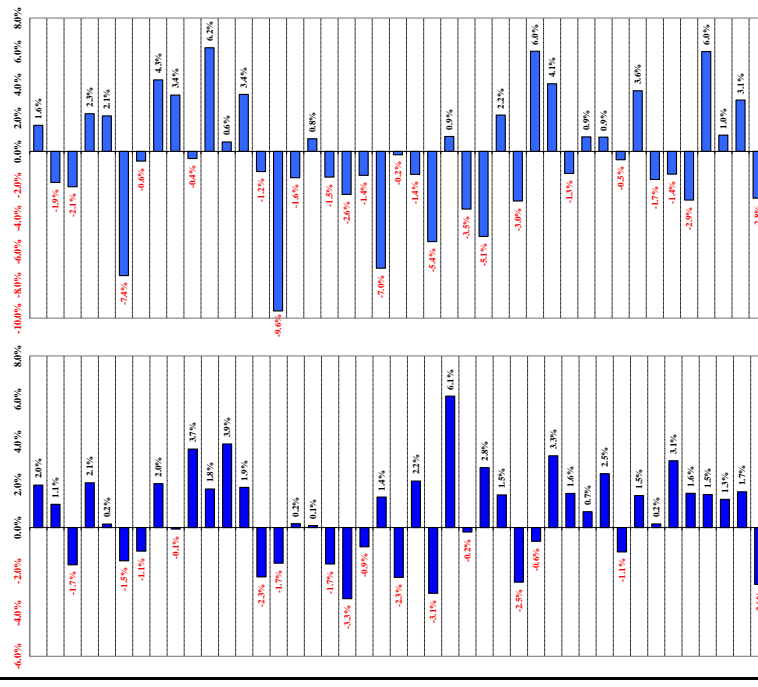
How Projected CY2018 Community Wastewater Flows Could Effect FY2020 Sewer Assessments 1,2,3

The flow components of FY2020 sewer assessments will be calculated using a 3-year average of CY2016 to CY2017 wastewater flows compared to FY2019 assessments that used a 3-year average of CY2015 to CY2017 wastewater flows.

Change in Average Flow

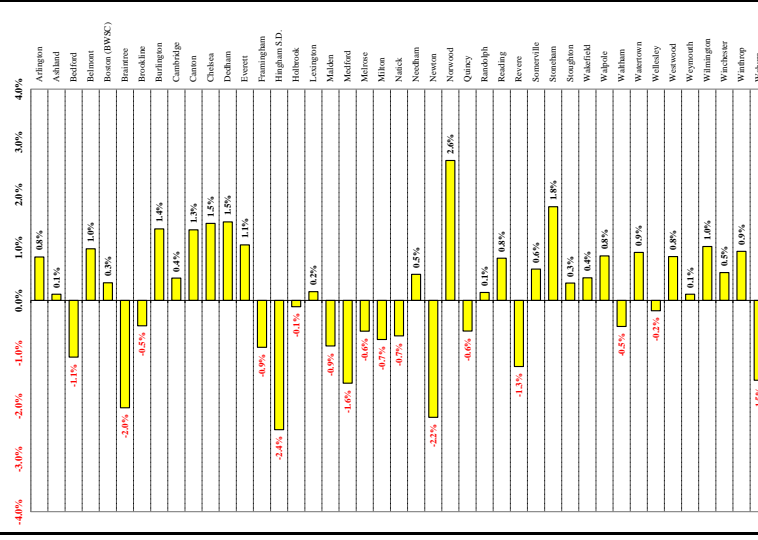


Change in Max. Month Flow

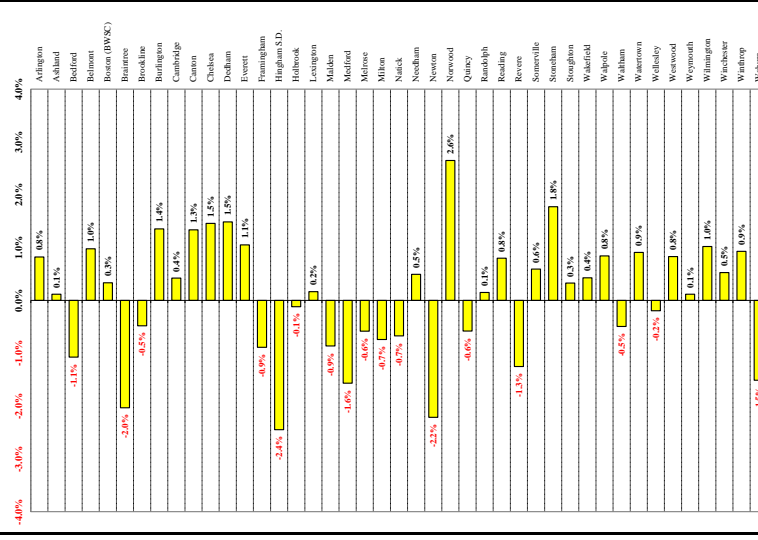


But as MWRA's sewer assessments are a ZERO-SUM calculation, a community's assessment is strongly influenced by the RELATIVE change in CY2016 to CY2018 flow share compared to CY2015 to CY2017 flow share, compared to all other communities in the system.

Change in Max. Month Flow Share



Assessment Impact Due to Change in Flow Share



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

Notes:
 1 MWRA uses a 3-year flow average to calculate sewer assessments. Three-year averaging smoothes the impact of year-to-year changes in community flow share, but does not eliminate the long-term impact of changes in each community's relative contribution to the total flow.
 2 Based on CY2015 to CY2018 average wastewater flows as of 08/27/18. Flow data is preliminary and subject to change pending additional MWRA and community review.
 3 CY2015 to CY2017 wastewater flows based on actual meter data for January to June, and project flows for July to December.
 4 Represents ONLY the impact on the total BASE assessment resulting from the changes in average and maximum wastewater FLOW SHARES.

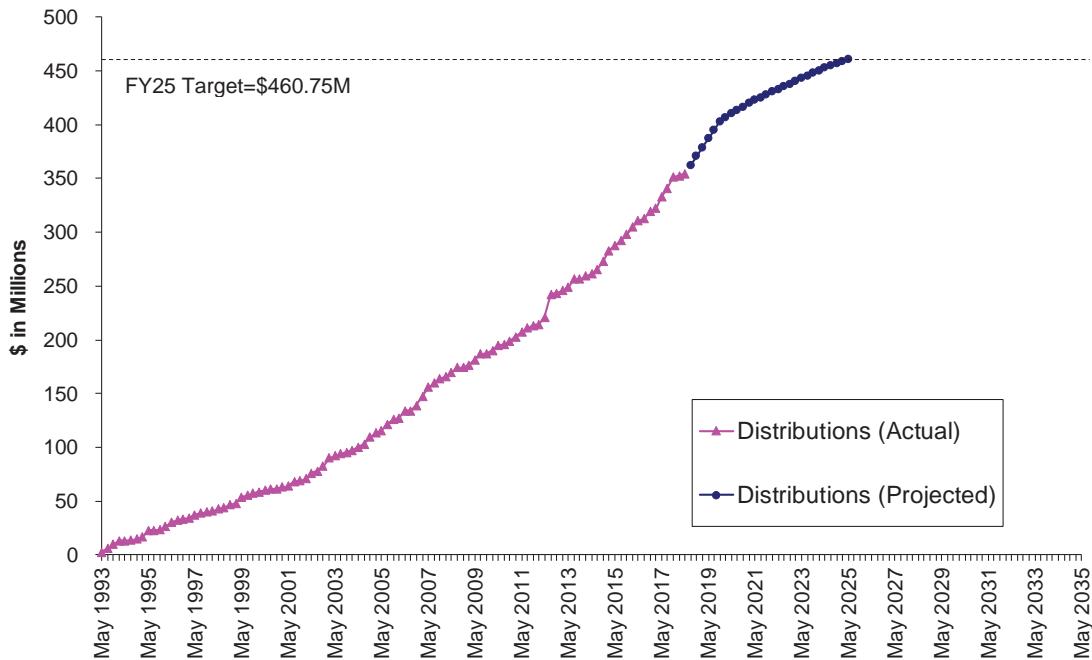
Community Support Programs

4th Quarter – FY18

Infiltration/Inflow Local Financial Assistance Program

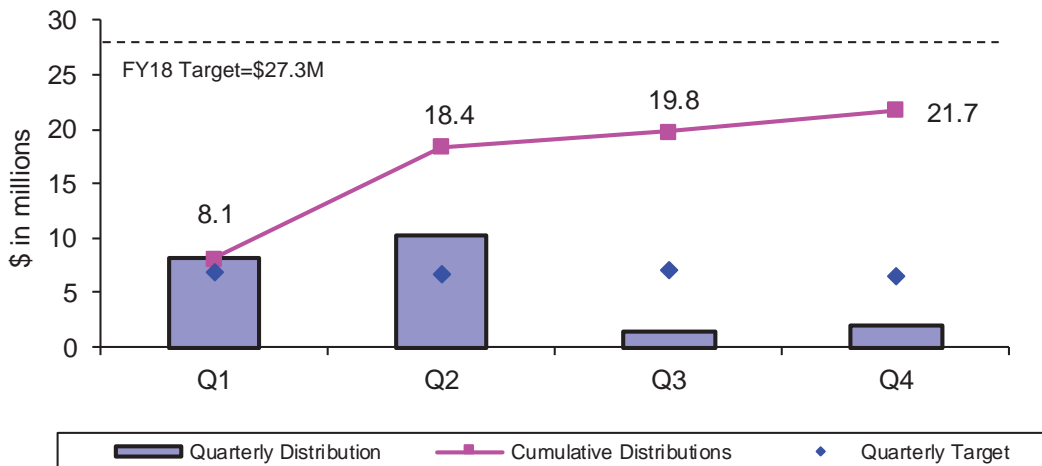
MWRA's Infiltration/Inflow (I/I) Local Financial Assistance Program provides \$460.75 million in grants and interest-free loans (average of about \$14 million per year from FY93 through FY25) to member sewer communities to perform I/I reduction and sewer system rehabilitation projects within their locally-owned 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 4th Quarter of FY18, \$1.9 million in financial assistance (grants and interest-free loans) was distributed to fund local sewer rehabilitation projects in Arlington, Medford, Needham and Wellesley. Total grant/loan distribution for FY18 is \$21.7 million. From FY93 through the 4th Quarter of FY18, all 43 member sewer communities have participated in the program and more than \$354 million has been distributed to fund 545 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 FY35. All scheduled community loan repayments have been made.

FY18 Quarterly Distributions of Sewer Grant/Loans



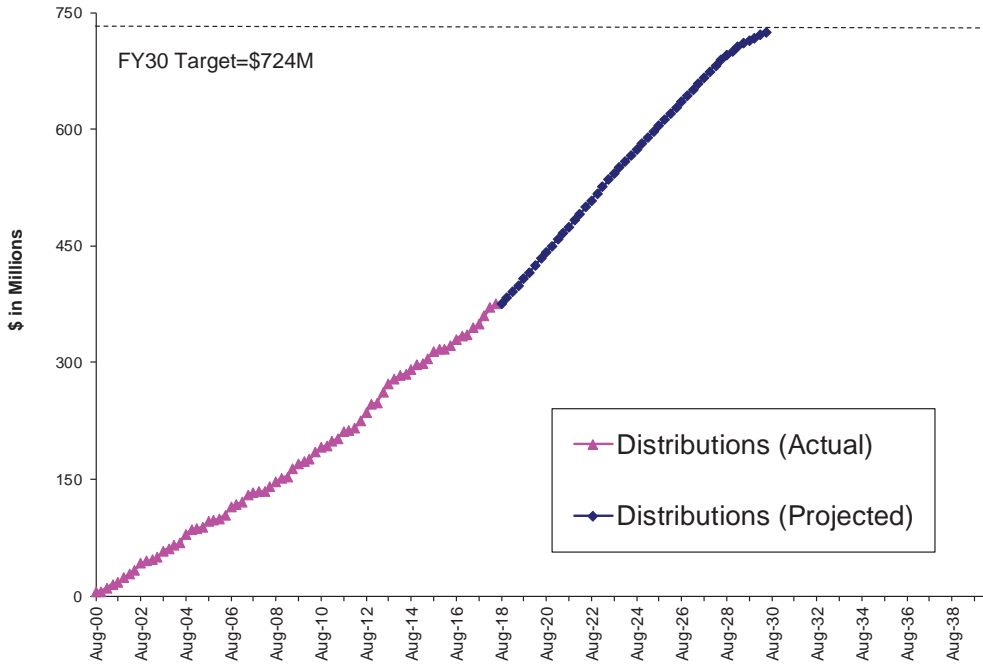
Community Support Programs

4th Quarter – FY18

Local Water System Assistance Program

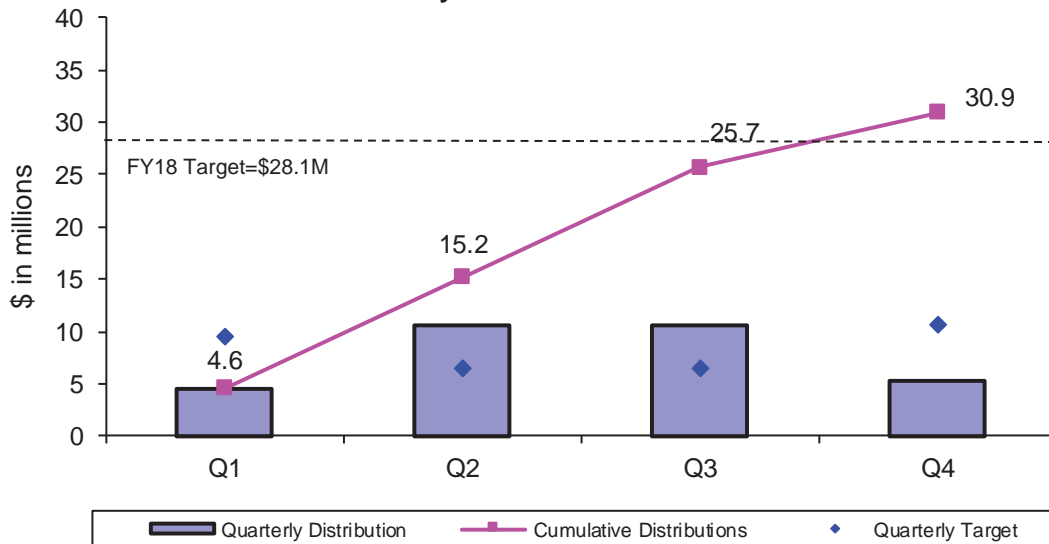
MWRA's Local Water System Assistance Programs (LWSAP) provides \$724 million in interest-free loans (an average of about \$24 million per year from FY01 through FY30) to member water communities to perform water main rehabilitation projects within their locally-owned water distribution systems. There 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 4th Quarter of FY18, \$5.2 million in interest-free loans was distributed to fund local water projects in Arlington, Needham, Peabody and Winchester. Total loan distribution for FY18 is \$30.9 million. From FY01 through the 4th Quarter of FY18, more than \$375 million has been distributed to fund 407 local water system rehabilitation projects in 42 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

4th 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.

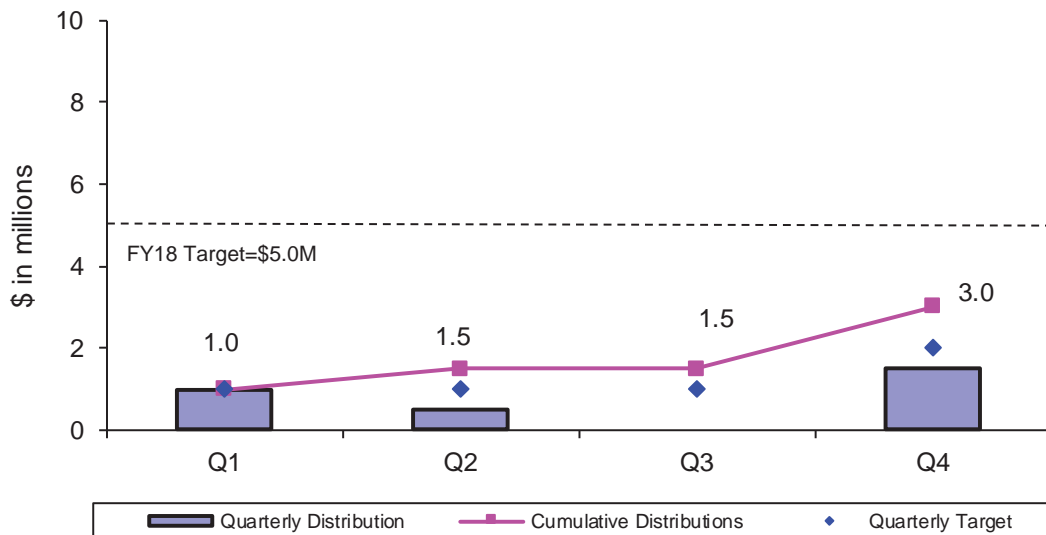
FY17 was the first year of the Lead Service Line Replacement Loan Program. During FY17, MWRA made three Lead Loan Program distributions to Newton for \$4.0 Million, Quincy for \$1.5 Million, and Winchester for \$0.5 Million.

FY18 is the second year of the Lead Loan Program. Two additional Lead Loan Program distributions were made during the 4th Quarter of FY18 to Needham (\$1,000,000) and Winchester (\$500,000). During FY18, five Lead Loan Program Distributions have been made for a total of \$3.0 Million.

Summary of Lead Loans:

Needham in FY18	\$1.0 Million
Winchester in FY18	\$0.5 Million
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
Winchester in FY17	\$0.5 Million
<u>TOTAL</u>	<u>\$9.0 Million</u>

FY18 Quarterly Distributions of Lead Service Line Replacement Loans

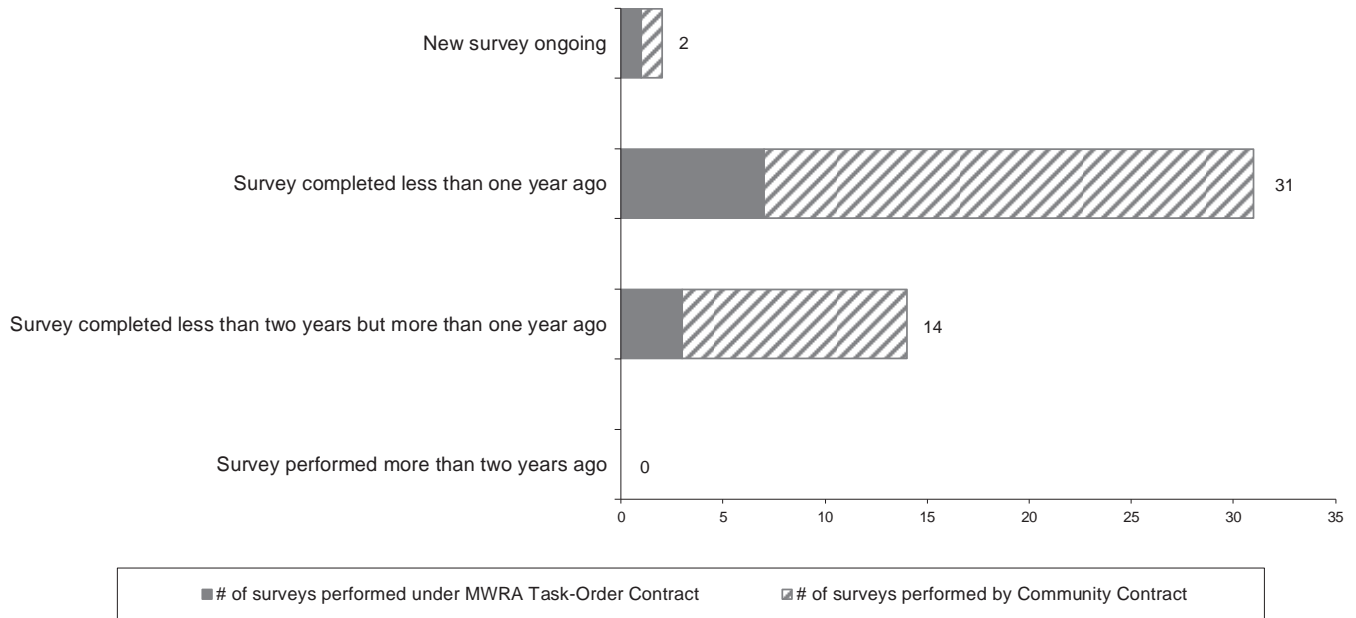


Community Support Programs

4th 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 4th 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	47,812	28,942	99,020
Low-Flow Fixtures (showerheads and faucet aerators)	10,000	2,018	1,346	2,941	1,981	8,286
Toilet Leak Detection Dye Tablets	-----	6,126	1,337	4,783	668	12,914

BUSINESS SERVICES

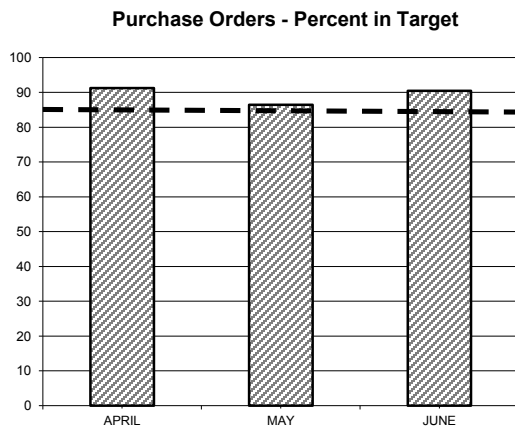
Procurement: Purchasing and Contracts

4th Quarter - FY18

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

Outcome: Processed 89% of purchase orders within target; Average Processing Time was 5.54 days vs. 4.92 days in Qtr 4 of FY17. Processed 58% (14 of 24) of contracts within target timeframes;

Purchasing



	No.	TARGET	PERCENT IN TARGET
\$0 - \$500	703	3 DAYS	83.7%
\$500 - \$2K	712	7 DAYS	94.3%
\$2K - \$5K	429	10 DAYS	92.7%
\$5K - \$10K	55	25 DAYS	83.6%
\$10K - \$25K	65	30 DAYS	86.1%
\$25K - \$50K	14	60 DAYS	57.1%
Over \$50K	39	90 DAYS	84.6%

The Purchasing Unit processed 2017 purchase orders, 46 less than the 2063 processed in Qtr 4 of FY17 for a total value of \$11,823,109 versus a dollar value of \$11,418,802 in Qtr 4 of FY17.

The purchase order processing target was not met for the \$0-\$500 dollar category due to vendor confirmations; the \$5K-\$10K category due to end user approvals and staff summary requirements; the \$25K-\$50K category due to vendor insurance requirements and staff summary requirements; and the

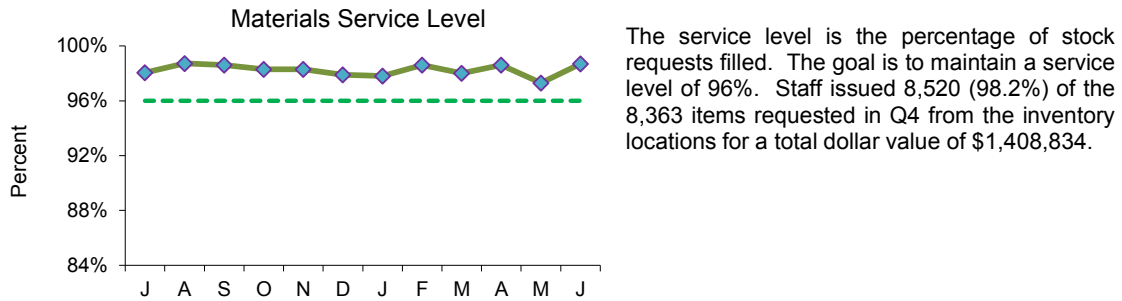
Contracts, Change Orders and Amendments

Ten contracts were not processed within the target timeframes. One contract was delayed due to the contractor's delay in providing the executed contracts and associated administrative documents. Another contract was delayed due to required changes to specifications. Four related contracts were delayed by one day due to external delays in obtaining approved insurance certificates from the firms and request that all four contracts commence simultaneously. Additionally, two contracts were delayed due to the prioritization of staff assignments. However, services were in place according to schedule. Another contract was delayed due to extensive revisions of the contract documents prior to bid required to address design issues and numerous bidder questions. The final contract was delayed due to the unexpected substitution of a selection committee member and the additional time required to respond to proposer's questions and to secure the execution of the contract.

Procurement processed twenty four contracts with a value of \$28,274,526 and four amendments with a value of \$0 (time extensions only). Fifty change orders were executed during the period. The dollar value of all non-credit change orders during Q4 FY18 was \$3,566,132 and the value of credit change orders was (\$881,692).

Staff reviewed 68 proposed change orders and 53 draft change orders.

Materials Management 4th Quarter - FY18



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 – shaft, joint kit, joint oil, clamps, shaft seal, retaining, spacer and wear rings for Residuals; light fixtures, power supplies, smoke detectors, potentiometer, ballasts, 3 phase monitor for Electrical Shop; dual thrust modules, oil and filters for Power & Pump; sensors, manometers, calibration gas, timer relays, switches and probes for I&C; diesel exhaust guards, air and fuel filters for Fleet Services.
- Chelsea – brakes, brake shoes, brake hardware, seals, rain guards, vehicle mats, freon, ball joints, control arms and plow modules for Fleet Services; sanding discs, sanding belts, vacuum bags and vacuum filters for Work Coordination.
- Southboro – tie down straps, spray paint and rakes for B&G; valves and power supply for Quality Assurance; unions for Maintenance and wrenches, sawblades and screwdrivers for Plumbing Shop; filters for Carroll Water Treatment Plant.

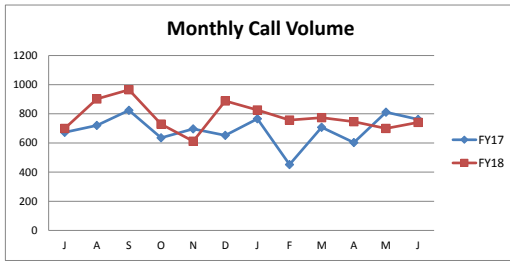
Property Pass Program:

- Five audits were conducted during Q4.
- Scrap revenue received for Q4 amounted to \$25,100. Year to date revenue received amounted to \$75,564.
- Revenue received from online auctions held during Q4 amounted to \$47,183. Year to date revenue received amounted to \$204,977.

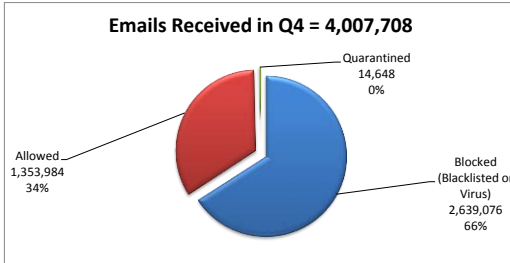
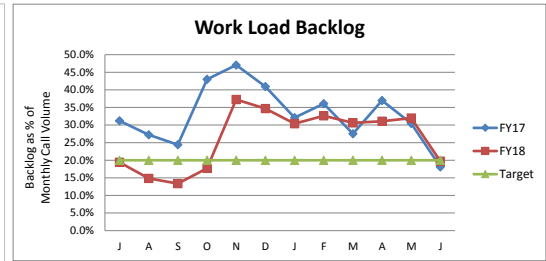
Items	Base Value July-17	Current Value w/o Cumulative New Adds	Reduction / Increase To Base
Consumable Inventory Value	8,292,452	8,213,447	-79,005
Spare Parts Inventory Value	8,939,710	8,724,733	-214,977
Total Inventory Value	17,232,162	17,197,479	-34,683

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

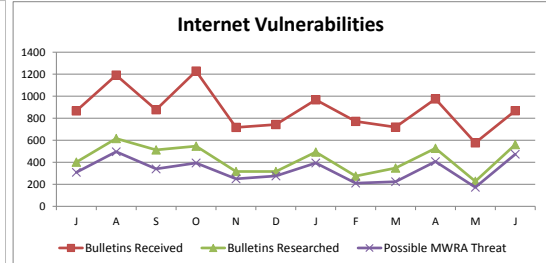
MIS Program 4th Quarter FY18



Performance & Backlog
 Call Volume: Peaked in April. FY18-Q4 call volume decreased by 1.3% from FY17-Q4.
 Call Backlog: Peaked in April. FY18-Q4 backlog average is 7.6% above targeted benchmark of 20%.



Information Security
 In Q4, pushed security fixes/updates to desktops/servers protecting against 465 vulnerabilities. McAfee quarantined 12 distinct viruses from 14 PCs. PCs are current with antivirus signatures for known malware.



Infrastructure:

Information Security Program: Annual Security Awareness training completed.

Server Backup Solution Replacement: Completed migration to CommVault.

Server Virtualization: Hardware implemented for server virtualization in CNY. Two servers migrated; to be completed in July.

Desktop Refresh: Base image created and test PCs being deployed. Windows 10 application compatibility being compiled.

Branch Office VPN Hardware Replacement: Deployment started, scheduled to be completed in July.

External Facing Server Hardware Replacement: New hardware infrastructure installed and configured. Discussion with vendors on migration strategy for moving Telog to new infrastructure environment.

Applications/Library & Records Center/Training:

Enterprise Content Management (ECM)/e-Construction: Project Overview & Charter has been signed-off. Completed 4 uses cases needed for the Technical Assistance Consulting services. Continued to work on the InfoStar application data analysis for the BHP & MWRA User Interfaces. Developed and documented 10 InfoStar Modules; sent to users for review. Additional modules to be documented. Work in process: (1) workflow for contract invoice review/approval of professional services contracts (2) Statement of Work, and (3) controlled vocabulary.

Maximo Upgrade: Upgraded with Asset Management 7.6.0.8 and IBM Control Desk (ICD) v7.6.0.3. ICD will serve as the MIS Service Desk, IT asset management, license management, contracts management, and change management tool. Developed an SOP for Maximo Control Desk IT Project Work Orders. Completed pre-Go Live data migration support activities. Nineteen out of 32 reports were converted from Magic to Maximo ICD; documentation for 12 Maximo reports completed.

GIS: New data layer was added to the Real Property Viewer and allows users to view new data as it becomes available in the Real Property database. ESRI identified a critical security vulnerability on the MWRA's version of ArcGIS Server. Staff applied the security patch to ensure secured services and data.

Lawson: ERP consultant Kinsey completed the review of HR, Payroll, Finance, Materials Management and Purchasing application customizations. Kinsey had discussions with users on issues and problems and discussed the technical upgrade roadmap with the MIS team. More meetings are expected to be scheduled with Kinsey to capture all outstanding Lawson user pain points including Supplier Portal, Strategic Sourcing and Contract Management.

PIMS: Release 10.1.4 was promoted to production to resolve issues with the Compliance Summary screen. This screen is used to check whether an industry is in significant non-compliance and if so, why.

Management Dashboard: Rolled out the Management Dashboard to non-union managers. The application provides managers a graphical calendar display of compensation, overtime, sick, and standby benefit time used by staff.

Open Checkbook: Updated the Employee and Payroll modules to roll up ten years rather than three years of financial data.

Library & Records Center: The Library fulfilled 82 research requests (304 YTD) and provided 162 periodicals, books and standards (874 YTD). Research topics include: energy market resources, General Edward Bridge, excavation work practices, molybdenum from data centers, lower Charles River water quality, lead pipe corrosion, tunnel redundancy resources, cyanobacteria, fecal contamination on recreational beaches. The Record Center (RC) handled 258 boxes (888 YTD) and scanned 171 (699 YTD) pages of documents for electronic delivery. The RC did 18 searches supporting MWRA business.

IT Training: For the quarter, 311 staff (585 YTD) attended 22 (61 YTD) classes. 31% of the workforce has attended at least one class year-to-date. 157 managers and selected Unit 6 & 9 staff attended the Cyber Security training held in 4 sessions at Chelsea and Deer Island. MAXIMO IBM Control Desk training was offered. Development included 5 Maximo Control Desk job-aids, 2 Lawson job-aids for Procurement, and re-writes of Reporting SPAM and Accessing On-Line Training job-aids.

Legal Matters

4th Quarter - FY18

PROJECT ASSISTANCE

Court and Administrative Orders:

- **Boston Harbor Litigation and CSO:** Reviewed and filed Semi-Annual Compliance and Progress Report.

Real Estate, Contract, Environmental and Other Support:

- **8(m) Permits:** Reviewed sixty (60) 8(m) permits. Drafted amendment to Babson 8(m) permit related to the use of a MWRA parcel of land in Wellesley and Needham. Drafted 8(m) permit related to the use of a MWRA parcel of land in the Fore River Shipyard in Quincy. Revised 8(m) permit related to use of MWRA parcel of land at Brattle Court Pump Station in Arlington.
- **Public Access Permits:** Drafted amendment to Town of Weston public access 8(m) permit.
- **Real Property:** Reviewed plans for land court case regarding Commonwealth real property in Brookline, MA under MWRA's care, custody, and control. Reviewed other parties' easement interests burdening MWRA's Spot Pond Covered Storage parcel of land and MWRA's easement interests adjacent in parcel of land owned by Langwood Commons LLC and drafted Memorandum of Understanding by and between MWRA and Langwood Commons LLC regarding the mutual future release of such easements. Recorded extension to order of conditions DEP 212-1097 for MWRA's Marlborough Maintenance Facility. Reviewed MWRA's real property interests at Hingham Pump Station, Spot Pond, Farwell Street in Newton, Commonwealth Avenue in Newton, Shaft 7 in Newton, the Prison Point CSO facility, Lynn and Revere adjacent to the General Edwards Bridge, Cottage Farm CSO facility, Quincy high level sewer, and Braintree/Weymouth Pump Station. Drafted one-day event license for entry at DITP for the Scleroderma Foundation. Reviewed Land Court plan related to MWRA's Clinton Water line in Brookline. Reviewed and revised letter related to removal of tree branches of adjacent property owners that overhang MWRA's Nash Hill property. Finalized license from MBTA to MWRA for MWRA's use of certain MBTA land in Dedham related to MWRA's Section 111 water main project. Drafted one-day event license for entry at DITP for Winthrop Advocacy Resources Community.
- **Wireless Cell Agreements:** Reviewed letters notifying wireless tenants at MWRA's Turkey Hill Water Tank in Arlington of scheduled painting of the water tank and their obligation to relocate their wireless equipment; assisted in drafting release and indemnification language for licensees to insulate MWRA from claims arising out of relocation of equipment.
- **Watershed Acquisitions:** Reviewed Wachusett Watershed Acquisition W-001196 located on Woodland Street in West Boylston, MA and Wachusett Watershed Acquisition, W-001206 located on Wachusett Street in Holden, MA.
- **NPDES:** Reviewed CSO variance submittal summarizing the 2017 receiving water quality in the Upper Mystic/Alewife Brook and Charles River. Reviewed requirement relative to the discharge of potable water to a water of the United States. Reviewed annual CSO discharge estimate report for 2017 required by the Lower Charles River/Charles Basin and Alewife Brook/Upper Mystic River CSO variances.
- **Legislation:** Revised legislation related to Hingham Pump Station and Stodder's Neck in Hingham concerning access easement for MWRA.
- **Public Records:** During the Fourth Quarter of FY 2018, 141 public records requests were received and 139 public records requests were closed.
- **Miscellaneous:** Reviewed draft memorandum of understanding between MWRA and the Massachusetts Office of Public Safety and Inspections for electrical inspection services.

LABOR, EMPLOYMENT AND ADMINISTRATIVE

New Matters

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

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

Matters Concluded

Received an arbitrator's decision in favor of the MWRA concerning a grievance brought by an employee who was allegedly working out of title.

LITIGATION/TRAC

New Matters MWRA v. Dewberry Engineers, Inc.: On April 13, 2018, MWRA filed a cost recovery action against NEL Corp., Western Surety Corp., and Dewberry Engineers, Inc. arising out of deficiencies in the design and construction of a replacement water main at Webster Avenue in Somerville, MA.

Howland Realty/Chelsea Lease Rent Abatement Demand: Made formal letter demand to landlord and landlord's counsel for either payment of *pro tanto* awards for Silver Line takings by MDOT/MBTA or for rent abatement for loss of useable space, resulting in payment of *pro tanto* payments of \$157,000 to MWRA.

Former Employee v. MWRA: Plaintiff initiated an action against MWRA arising out of his April 9, 2015 termination. Plaintiff had been terminated by MWRA due to the multiple instances of sleeping on the job, as well as his inappropriate conduct towards co-workers. Plaintiff claims his termination constitutes handicap discrimination under G.L. c. 151B. On May 29, 2018, MWRA answered Plaintiff's complaint denying Plaintiff's allegations.

Significant

Claims There are no new Significant Claims to report.

Significant

Developments DaPrato v. MWRA, C.A. No. 2015 CV 3687 D: Prepared oppositions to DaPrato post-trial motions.

D'Amico v. MWRA v. Green et al, C.A. 1784 CV 04097 C: On May 16, 2018, MWRA served Third-Party Defendant Green International Affiliates, Inc. ("Green") with a special motion to dismiss its counterclaim against MWRA on the grounds that the counterclaim is solely based upon MWRA's filing of an affirmative lawsuit against Green and is therefore prohibited under G.L. c. 231 § 59H.

Closed Cases There are no Closed Claims to report.

Closed Claims During the Fourth Quarter of FY 2018, no new subpoenas were received and one subpoena was pending at the end of the Fourth Quarter FY 2018.

Subpoenas During the Fourth Quarter of FY 2018, no new subpoenas were received and one subpoena was pending at the end of the Fourth Quarter FY 2018.

Wage

Garnishments There are currently 14 Trustee Process matters, 4 of which are considered active and are monitored by Law Division.

SUMMARY OF PENDING LITIGATION MATTERS

TYPE OF CASE/MATTER	As of June 2018	As of Mar 2018	As of Dec 2017
Construction/Contract/Bid Protest (other than BHP)	2	1	1
Tort/Labor/Employment	3	2	2
Environmental/Regulatory/Other	2	2	2
Eminent Domain/Real Estate	0	0	0
total – all defensive cases	7	5	5
Other Litigation matters (restraining orders, etc.) <u>MWRA v. Thomas Mercer</u> <u>MWRA v. NSTAR and HEEC</u>	2	2	2
total – all pending lawsuits	9	7	7
Claims not in suit: <u>Thang Viet Vu and Oanh Vu Claim</u>	1	1	2
Bankruptcy	2	2	2
Wage Garnishment	4	15	15
TRAC/Adjudicatory Appeals	1	1	1
Subpoenas	1	1	1
TOTAL – ALL LITIGATION MATTERS	18	27	28

TRAC/MISC.

New Appeals: No new TRAC Appeals.

Settlement by Agreement of Parties No Settlement by Agreement of Parties.

Stipulation of Dismissal No Joint Stipulation of Dismissals filed.

**Notice of Dismissal
Fine paid in full** No instances of Notices of Dismissal, Fine paid in full.

Tentative Decision There were no Tentative Decisions issued in the 4th Quarter FY 2018.

Final Decisions There were no Final Decisions issued in the 4th Quarter FY 2018.

Significant Developments Twin Rivers Appeal (Docket No. 17-05) EPA submitted its report, dated June 13, 2018, advising the parties that after review of parties' sampling and test records, it found no evidence of any departure by MWRA from mandated acrolein test procedures.

INTERNAL AUDIT AND CONTRACT AUDIT ACTIVITIES

4th Quarter - FY18

Highlights

During the 4th Quarter FY18, IA completed an audit of overtime practices and timesheet preparation to determine compliance with existing policies and practice. Recommendations were made to better maintain overtime records and manage overtime practices. An audit was also completed of certain Fleet Services practices, in particular recommending that the preventative job plans for vehicles be inputted into Maximo according to the manufacturers' maintenance schedules. Many of these recommendations for both assignments were already closed by the end of the quarter.

Other assignments completed include an audit of prevailing wage rates paid on construction contracts, and a report of MWRA procedures on police details. IA also completed a review of one consultant preliminary, two construction labor burden reviews and one incurred cost audit. The HEEC 2017 true-up was finalized, a NEFCo contract review for 2017 was completed and an analysis of the DITP electricity rate was prepared related to the new 2018 cost structure.

Status of Recommendations

During FY18, a total of 36 recommendations were closed, of which 18 were from prior fiscal years' audits.

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

Report Title (issue date)	Audit Recommendations		
	Open	Closed	Total
Unmatched Receipts and Accruals (6/30/15)	2	8	10
Warehouse Cycle Counts at DITP (11/5/15), Southboro (11/6/15) and Chelsea (12/4/15)	2	23	25
MIS Mobile Equipment Asset Tracking (9/26/16)	1	11	12
Wright Express (WEX) Credit Card Fuel Purchases (11/16/16)	3	10	13
Purchase Card Activity on Deer Island (3/31/17)	3	12	15
Review of Uniform Debit Card Program (3/30/18)	3	3	6
Overtime & Timesheet Review (6/30/18)	2	14	16
Fleet Services Process Review (6/30/18)	4	1	5
Total Recommendations	20	82	102

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.

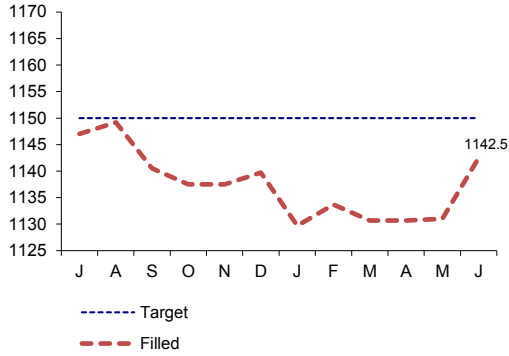
Cost Savings	FY14	FY15	FY16	FY17	FY18 Q4	TOTAL
Consultants	\$294,225	\$87,605	\$88,312	\$272,431	\$118,782	\$861,355
Contractors & Vendors	\$415,931	\$1,146,742	\$1,772,422	\$3,037,712	\$1,323,156	\$7,695,963
Internal Audits	\$923,370	\$543,471	\$220,929	\$224,178	\$203,702	\$2,115,650
Total	\$1,633,526	\$1,777,818	\$2,081,663	\$3,534,321	\$1,645,640	\$10,672,968

OTHER MANAGEMENT

Workforce Management

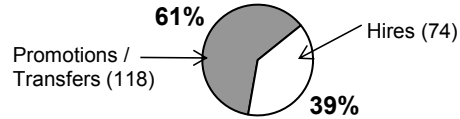
4th Quarter FY18

FTE Tracking



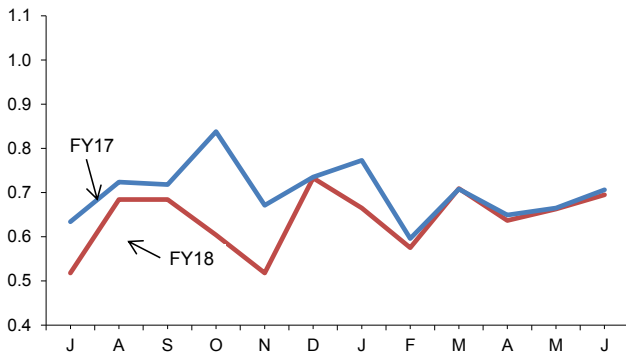
FY18 Target for FTE's = 1150
FTE's as of JUNE 2018 = 1142.5

Positions Filled by Hires/Promotions
FY18-YTD



	Pr/Trns	Hires	Total
FY16	99 (62%)	60 (38%)	159
FY17	155 (68%)	72 (32%)	227
FY18	118(61%)	74 (39%)	192

Average Monthly Sick Leave Usage
Per Employee

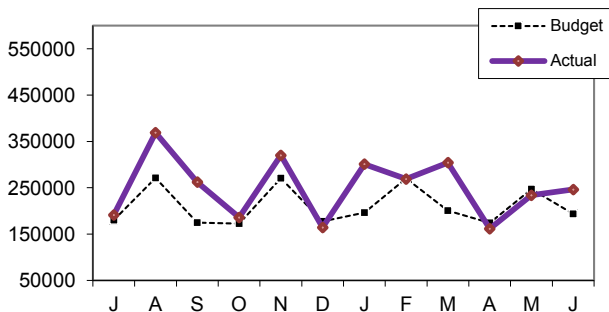


Average monthly sick leave thru the 4th Quarter of FY18 decreased as compared thru FY17 (8.08 to 7.98 days)

	Employees	YTD	Total	FMLA %	FY17
Admin	136	6.64	6.64	13.5%	7.75
Aff. Action	6	7.10	7.10	7.6%	6.28
Executive	4	3.33	3.33	19.1%	13.80
Finance	34	6.05	6.05	0.0%	8.50
Int. Audit	7	4.94	4.94	34.9%	6.51
Law	14	6.85	6.85	9.2%	8.98
OEP	8	3.57	3.57	0.0%	5.74
Operations	936	7.68	7.68	16.5%	8.55
Pub. Affs.	12	10.43	10.43	68.1%	6.31
MWRA Avg	1157	7.69	7.69	16.7%	8.42

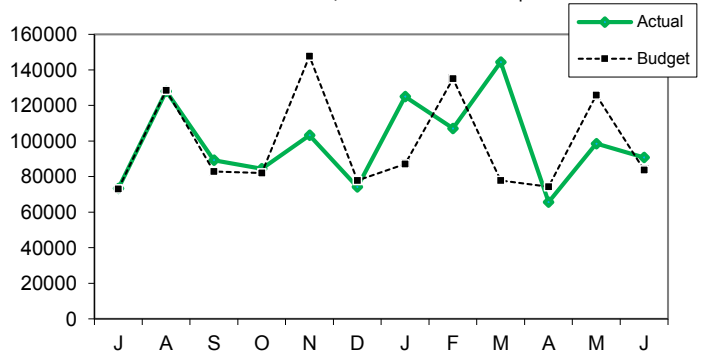
Percent of sick leave usage for FY18, attributable to Family and Medical Leave Act (FMLA) is 16.7% .

Field Operations
Current Month Overtime \$



Total Overtime for Field Operations for the fourth quarter of 2018 was \$641,632 which is \$27k over budget. Emergency overtime was \$250k, which was (\$56k) under budget due to a relatively dry spring, the majority of the OT was for rain events. Coverage overtime was \$174k, which was \$17k over budget, reflecting the month's shift coverage requirements. Planned overtime was \$217k or \$66k over budget, mainly for maintenance off hours work, planned operations, maintenance work completion, and community assistance (water truck). YTD, FOD has spent \$3,008,253 on overtime which is \$480k over budget.

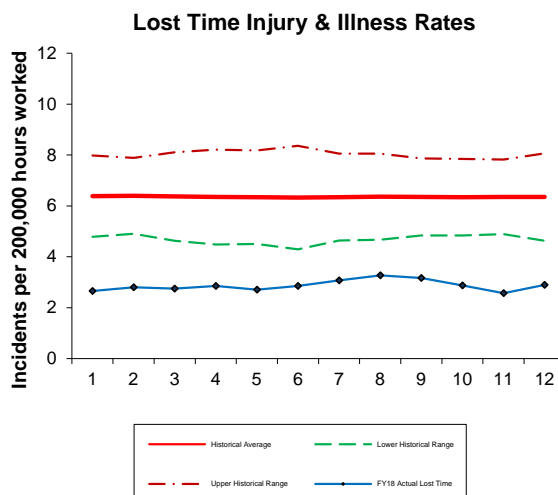
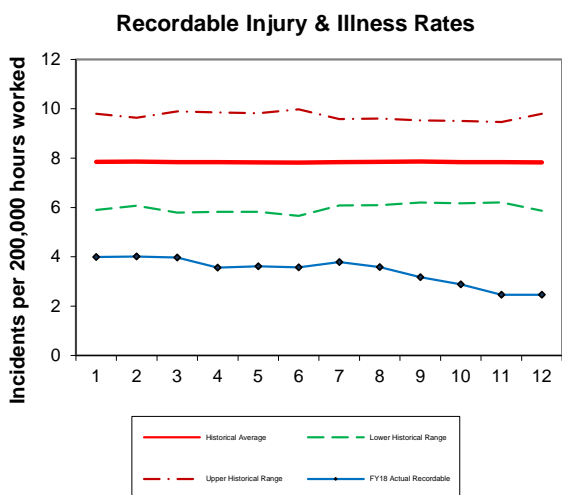
Deer Island Treatment Plant
Current Quarter Overtime \$



Deer Island's total overtime expenditure for the 4th quarter of 2018 was \$255k, which was (\$29k) under budget. Less than anticipated amount storm coverage overtime, (\$23k), combined with a lesser amount shift coverage overtime, (\$6k) mainly account for the overtime variance. A combination of planned/unplanned overtime was right on budget. YTD Deer Island has spent \$1,184,093 on overtime which is \$8k over budget.

Workplace Safety

4th Quarter - FY18



- 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 FY17. The "Upper" and "Lower Historical Ranges" are computed using these same data – adding and subtracting two standard deviations respectively. FY18 actual incident rates can be expected to fall within this historical range.

WORKERS COMPENSATION HIGHLIGHTS

	4th Quarter Information		Open Claims
	New	Closed	
Lost Time	4	21	54
Medical Only	13	24	17
Report Only	14	14	

* June 30 2018 Weekly Indemnity included in Lost time Open Claims

17 Retired and Former Employees are included in Total Open Claims

	QYTD	FYTD
Regular Duty Returns	10	31
Light Duty Returns	0	2

COMMENTS:

Regular Duty Returns

APR 3 employees' returned to Full Duty, no restrictions

MAY 5 employee's returned to Full Duty, no restrictions

JUNE 2 employee returned to Full Duty, no restrictions

Light Duty Returns

APR No employees returned to Light Duty from workers' compensation

MAY No employees returned to Light Duty from workers' compensation

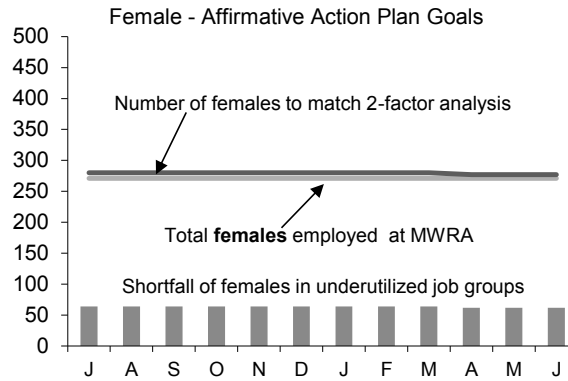
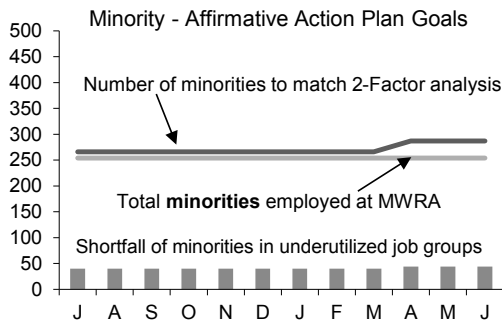
JUNE No employees returned to Light Duty from workers' compensation

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 in the month they a full

MWRA Job Group Representation
4th Quarter - FY18



Highlights:

At the end of Q4 FY18, 8 job groups or a total of 44 positions are underutilized by minorities as compared to 7 job groups or a total of 37 positions at the end of Q4 FY17; for females 7 job groups or a total of 62 positions are underutilized females as compared to 7 job groups or a total of 52 positions at the end of Q4 FY17. During Q4, 5 minorities and 3 females were hired. During this same period 1 minority and 2 females terminated. **Effective February, 2018, the Board of Directors approved the 2018 Affirmative Action's workforce goals. The new goals are the following: minorities 25.1% and females 24.3%.**

Underutilized Job Groups - Workforce Representation

Job Group	Employees	Minorities	Achievement	Minority	Females	Achievement	Female
	as of 6/30/2018	as of 6/30/2018	Level	Over or Under Underutilized	As of 6/30/2018	Level	Over or Under Underutilized
Administrator A	24	2	3	-1	10	8	2
Administrator B	23	2	4	-2	5	3	2
Clerical A	31	12	7	5	26	21	5
Clerical B	28	9	7	2	10	11	-1
Engineer A	78	27	17	10	18	16	2
Engineer B	59	14	12	2	12	7	5
Craft A	114	17	41	-24	1	4	-3
Craft B	151	24	45	-21	3	5	-2
Laborer	67	20	14	6	2	2	0
Management A	100	15	24	-9	35	39	-4
Management B	44	8	8	0	9	4	5
Operator A	67	5	13	-8	0	5	-5
Operator B	65	15	15	0	4	20	-16
Professional A	33	5	8	-3	20	16	4
Professional B	156	46	38	8	78	57	21
Para Professional	59	17	19	-2	31	46	-15
Technical A	53	13	11	2	6	12	-6
Technical B	7	3	1	2	1	1	0
Total	1159	254	287	28/-44	271	277	61/-62

AACU Candidate Referrals for Underutilized Positions

Job Group	Title	# of Vac	Requisition / Ext.	Int.	Promotion s/Transfers	AACU Ref. External	Position Status
Admin A	Director Human Resources	1	Int	Int	Int	0	Promo = WF
Admin B	Superintendent Clinton AWWTP	1	Int	Int	Int	0	Promo = WM
Management A	Deputy Contract Manager	1	Ext	Ext	Ext	0	NH = AF
Craft A	M&O Specialist	2	Int	Int	Int	0	Promo = WM (2)
Craft A	General Foreman	1	Int	Int	Int	0	Promo=WM
Craft A	WDS General Foreman	1	Int	Int	Int	0	Promo = WM
Craft B	Electrician	1	Ext	Ext	Ext	0	NH = WM
Craft B	Jr. Instrument Technician	1	Ext	Ext	Ext	0	NH = WM
Craft B	Instrument Technician	3	Ext	Ext	Ext	0	NH = (3)WM
Craft B	Facilities Specialist	1	Int/Ext	Int	Int	0	Promo = WM
Operator A	Area Supervisor	3	Int	Int	Int	0	T=(2)WM, Promo=WF
Operator A	Transmission & Treatment Operator	3	Int	Int	Int	0	T=(2)WM, Promo=WM
Operator B	Operator	1	Int	Int	Int	0	Promo = HM
Professional A	Lab Supervisor II WQ	1	Int	Int	Int	0	Promo = WF
Technical A	Communication & Control Technician	1	Int/Ext	Int	Int	0	Promo = WM
Technical A	O & M Systems Specialist	1	Int	Int	Int	0	Promo = BM

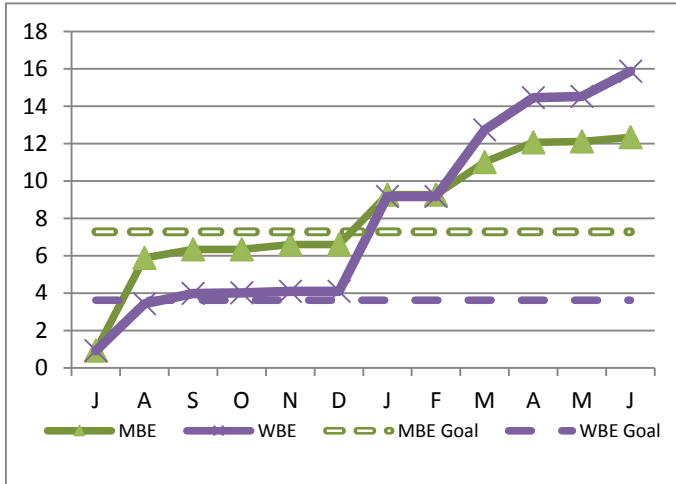
MBE/WBE Expenditures

4th Quarter - FY18

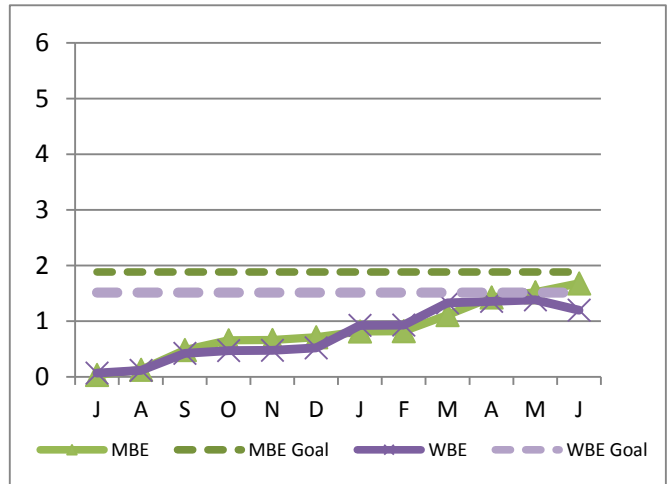
MBE/WBE targets are determined based on annual MWRA expenditure forecasts in the procurement categories noted below. The goals for FY18 are based on 85% of the total construction and 75% of the total professional projected spending for the year. Certain projects have been excluded from the goals as they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

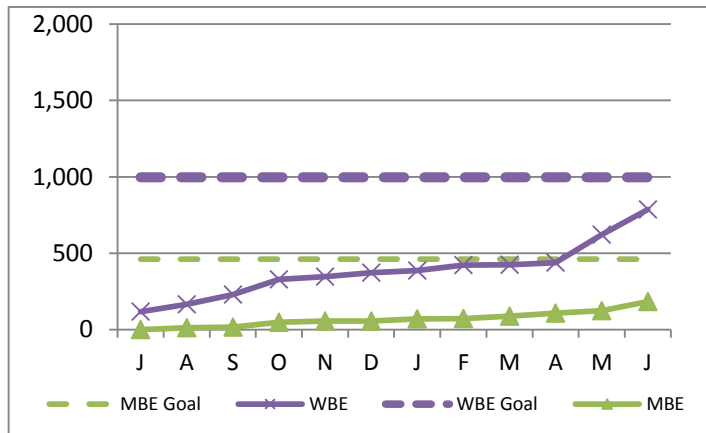
Construction



Professional Services



Goods/Services



FY18 spending and percentage of goals achieved, as well as FY17 performance are as follows:

MBE			
FY18 YTD		FY17	
Amount	Percent	Amount	Percent
12,337,140	169.4%	5,628,738	99.5%
1,680,583	89.2%	920,597	162.8%
183,744	39.8%	179,359	29.8%
14,201,467	147.5%	6,728,694	98.6%

WBE			
FY18 YTD		FY17	
Amount	Percent	Amount	Percent
15,875,719	438.4%	3,690,334	131.3%
1,196,643	79.0%	533,917	117.5%
786,485	78.9%	1,553,214	181.6%
17,858,847	291.2%	5,777,465	140.2%

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 4th Quarter - FY18

As of June 2018, total expenses are \$736.8 million, \$7.0 million or 0.9% lower than budget, and total revenue is \$751.1 million, \$7.4 million or 1.0% over budget, for a net variance of \$14.4 million.

Expenses –

Direct Expenses are \$224.7 million, \$7.8 million or 3.4% below budget.

- **Wages & Salaries** are under budget by \$3.4 million or 3.3%. Regular pay is \$3.3 million under budget, due to lower head count, and timing of backfilling positions. At the end of June, the average Full Time Equivalent (FTE) positions were 1,138, twelve fewer than the 1,150 FTE's budgeted.
- **Maintenance** expenses are \$3.1 million or 9.7% under budget due mostly to timing of projects such as the HVAC upgrades at the Braintree/Weymouth Pump Station in Field Operations and door replacements and instrumentation upgrades at Deer Island, offset by overspending for emergency repairs to gravity thickeners #5 and #6 at Deer Island.
- **Fringe Benefits** expenses are \$929k or 4.4% under budget, primarily for lower Health Insurance costs of \$824k due to fewer employees and retirees than budgeted participating in health insurance plans, and the shift from family to individual plans which are less expensive.
- **Overtime** expenses are \$461k over budget or 11.2% due to recent wet weather events and snow removal, and off-hours maintenance earlier in the fiscal year.
- **Other Materials** expenses are \$399k or 6.0% under budget due to lower expenses for Health and Safety materials at Deer Island, lower Vehicle Expenses due to lower than budgeted fuel prices, and lower Vehicle Purchases due to timing of delivery.
- **Professional Services** expenses are \$266k or 3.7% under budget due to timing of Engineering Services in Operations and Legal Services in Treasury, Law, and Administration.
- **Utilities** expenses are \$262k or 1.2% over budget, with Diesel over budget by \$280k due to and additional delivery at Deer Island to top off the tanks, partially offset by lower than Water expenses of \$97k reflecting lower use at Deer Island and water efficiency measures at the headworks.
- **Chemicals** are \$177k or 1.8% under budget due to lower flows at the Deer Island Wastewater Treatment Plant and the Carroll Water Treatment Plant and timing of deliveries. Underspending of \$304k for Soda Ash reflects lower flows and higher natural pH at CWTP, underspending of \$139k for activated carbon, \$104k for sodium hypochlorite and \$105k for hydrofluosilicic acid, partially offset by overspending of \$326k for Hydrogen Peroxide due to the lower flows at Deer Island and overspending of \$246k for Ferric Chloride also at Deer Island due to struvite control.
- **Worker's Compensation** expenses are \$176k or 7.6% under budget, primarily due to resolution of a number of claims through return to work.

	June 2018 Year-to-Date			
	Period 12 YTD Budget	Period 12 YTD Actual	Period 12 YTD Variance	%
EXPENSES				
WAGES AND SALARIES	\$ 104,286,370	\$ 100,875,415	\$ (3,410,955)	-3.3%
OVERTIME	4,110,637	4,571,567	460,930	11.2%
FRINGE BENEFITS	20,997,975	20,068,927	(929,048)	-4.4%
WORKERS' COMPENSATION	2,322,980	2,147,063	(175,917)	-7.6%
CHEMICALS	9,836,933	9,659,734	(177,199)	-1.8%
ENERGY AND UTILITIES	21,735,222	21,997,423	262,201	1.2%
MAINTENANCE	32,200,785	29,067,175	(3,133,610)	-9.7%
TRAINING AND MEETINGS	406,269	314,745	(91,524)	-22.5%
PROFESSIONAL SERVICES	7,221,622	6,955,638	(265,984)	-3.7%
OTHER MATERIALS	6,692,660	6,293,935	(398,725)	-6.0%
OTHER SERVICES	22,764,526	22,794,735	30,209	0.1%
TOTAL DIRECT EXPENSES	\$ 232,575,979	\$ 224,746,357	\$ (7,829,623)	-3.4%
INSURANCE	\$ 2,013,452	\$ 3,231,510	\$ 1,218,058	60.5%
WATERSHED/PILOT	25,164,006	23,756,756	(1,407,250)	-5.6%
HEEC PAYMENT	957,445	782,135	(175,310)	-18.3%
MITIGATION	1,596,950	1,574,890	(22,060)	-1.4%
ADDITIONS TO RESERVES	821,116	821,116	-	0.0%
RETIREMENT FUND	3,277,369	3,277,369	-	0.0%
POST EMPLOYEE BENEFITS	5,035,422	5,035,422	-	0.0%
TOTAL INDIRECT EXPENSES	\$ 38,865,760	\$ 38,479,198	\$ (386,562)	-1.0%
REBATE	\$ -	\$ 225,000	\$ 225,000	---
STATE REVOLVING FUND	84,931,906	80,637,870	(4,294,036)	-5.1%
SENIOR DEBT	264,560,267	280,901,707	16,341,440	6.2%
CORD FUND	-	-	-	---
DEBT SERVICE ASSISTANCE	(391,580)	(1,336,306)	(944,726)	241.3%
CURRENT REVENUE/CAPITAL	13,200,000	13,200,000	-	0.0%
SUBORDINATE MWRA DEBT	85,443,447	85,443,447	-	0.0%
LOCAL WATER PIPELINE CP	3,794,944	1,482,833	(2,312,111)	-60.9%
CAPITAL LEASE	3,217,060	3,217,060	-	0.0%
DEBT PREPAYMENT	10,900,000	10,900,000	-	0.0%
VARIABLE DEBT	-	(7,595,896)	(7,595,896)	---
HEEC CABLE CAPACITY RESERV	6,532,146	6,532,146	-	0.0%
DEFEASANCE ACCOUNT	-	-	-	---
TOTAL DEBT SERVICE	\$ 472,188,190	\$ 473,607,861	\$ 1,419,671	0.3%
TOTAL EXPENSES	\$ 743,629,929	\$ 736,833,416	\$ (6,796,514)	-0.9%
REVENUE & INCOME				
RATE REVENUE	\$ 717,054,000	\$ 717,054,000	\$ -	0.0%
OTHER USER CHARGES	9,011,070	9,019,144	8,074	0.1%
OTHER REVENUE	7,359,078	12,230,488	4,871,410	66.2%
RATE STABILIZATION	-	-	-	---
INVESTMENT INCOME	10,205,781	12,755,559	2,549,778	25.0%
TOTAL REVENUE & INCOME	\$ 743,629,929	\$ 751,059,191	\$ 7,429,262	1.0%

Indirect Expenses are \$38.5 million, \$387k or 1.0% under budget reflecting lower Watershed Reimbursement of \$1.4 million due to a year-end over accrual at the end of FY17 and lower PILOT payments, and lower than budgeted HECC cable O&M of \$175k partially offset by high insurance claims over budget by \$1.2 million due to a litigation loss.

Debt Service Expenses totaled \$473.4 million, \$1.4 million over budget after the transfer of \$11.9 million to the Defeasance Account. Of the \$11.9 million transferred to the Defeasance Account, \$7.6 million represents year to date savings due to lower than budgeted variable interest rates and \$4.8 million in additional interest savings due to timing of SRF borrowing and lower costs than budgeted for senior debt borrowing.

Revenue and Income –

Total Revenue and Income is \$751.1 million, \$7.4 million higher than budget, primarily due to a \$4.2 million LIBOR settlement from Barclays Bank PLC. Revenues were also over budget by \$2.5 million for favorable returns on investment income, \$228k for the final payment of a class action lawsuit settlement for derivative agreements, and \$301k for disposal of surplus material.

Cost of Debt 4th Quarter – FY18

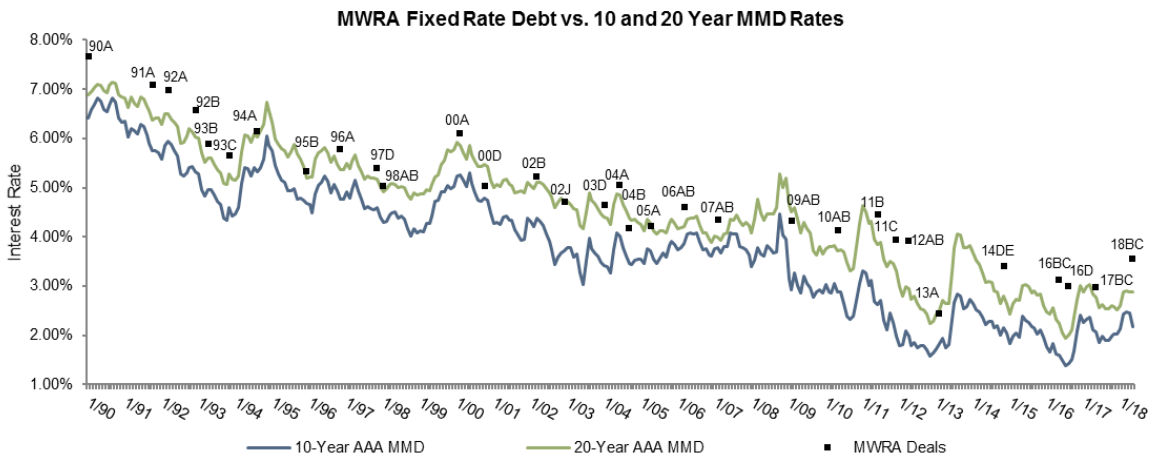
MWRA borrowing costs are a function of the fixed and variable tax exempt interest rate environment, the level of MWRA’s variable interest rate exposure and the perceived creditworthiness of MWRA. Each of these factors has contributed to decreased MWRA borrowing costs since 1990.

Average Cost of MWRA Debt FYTD

Fixed Debt (\$3,551.7)	3.79%
Variable Debt (\$442.1)	1.51%
SRF Debt (\$942.8)	1.51%
Weighted Average Debt Cost (\$4,937)	3.13%

Most Recent Senior Fixed Debt Issue May 2018

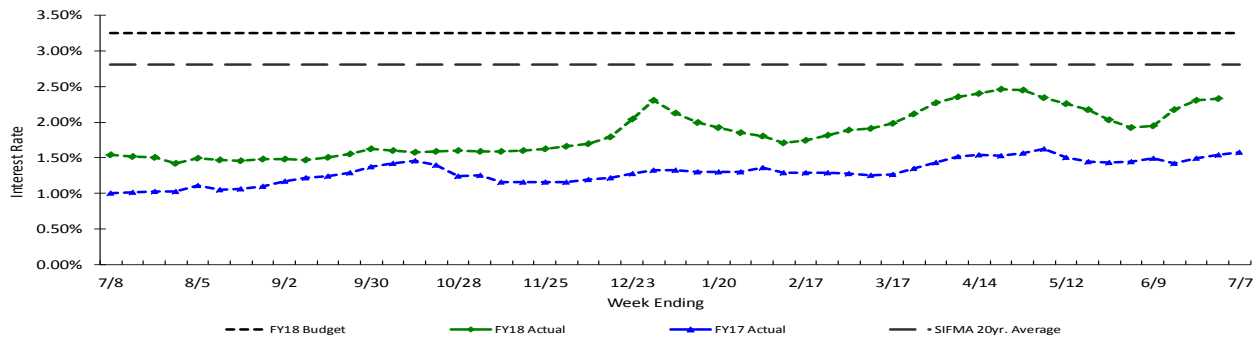
2018 Series B & C (\$129.5) 3.56%



Bond Deal	1993B	1993C	1994A	1995B	1996A	1997D	1998AB	2000A	2000D	2002B	2002J	2003D	2004A	2004B
Rate	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%	4.17%
Avg Life	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	13.5 yrs

Bond Deal	2005A	2006AB	2007AB	2009AB	2010AB	2011B	2011C	2012AB	2013A	2014DEF	2016BC	2016D	2017BC	2018BC
Rate	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%	3.56%
Avg Life	18.4 yrs	25.9 yrs	24.4 yrs	15.4 yrs	16.4 yrs	18.8 yrs	16.5 yrs	17.9 yrs	9.9 yrs	15.1 yrs	17.4 yrs	18.8 yrs	11.2 yrs	11.7 yrs

Weekly Average Variable Interest Rates vs. Budget

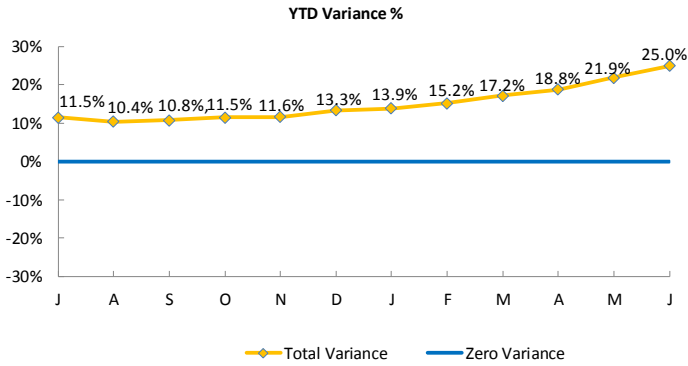


MWRA currently has ten variable rate debt issues with \$831.4 million outstanding, excluding commercial paper. Of the ten outstanding series, five have portions which have been swapped to fixed rate. Variable rate debt has been less expensive than fixed rate debt in recent years as short-term rates have remained lower than long-term rates on MWRA debt issues. In June, SIFMA rates ranged from a high of 1.51% to a low of 1.05% for the month. MWRA’s issuance of variable rate debt, although consistently less expensive in recent years, results in exposure to additional interest rate risk as compared to fixed rate debt.

Investment Income

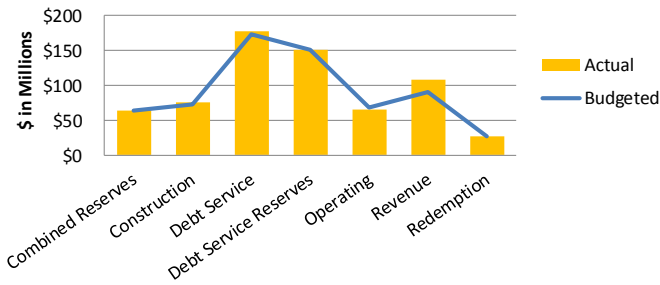
4th Quarter – FY18

Year To Date

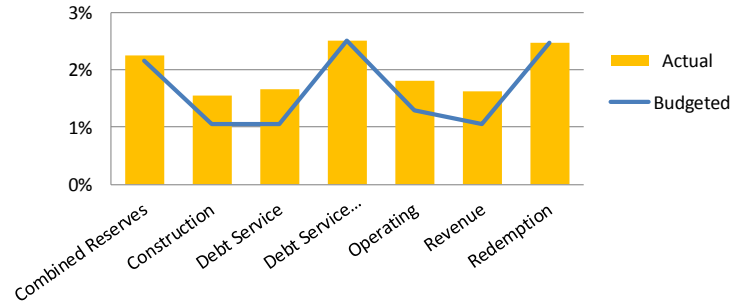


	YTD BUDGET VARIANCE			
	(\$'000)			
	BALANCES IMPACT	RATES IMPACT	TOTAL	%
Combined Reserves	\$4	\$66	70	5.1%
Construction	\$22	\$383	405	52.8%
Debt Service	\$41	\$1,079	1,120	61.6%
Debt Service Reserves	\$17	(\$7)	10	0.3%
Operating	(\$26)	\$176	150	17.1%
Revenue	\$183	\$611	794	84.1%
Redemption	\$0	\$0	0	0.0%
Total Variance	\$241	\$2,309	\$2,550	25.0%

YTD Average Balances Budgeted vs. Actual

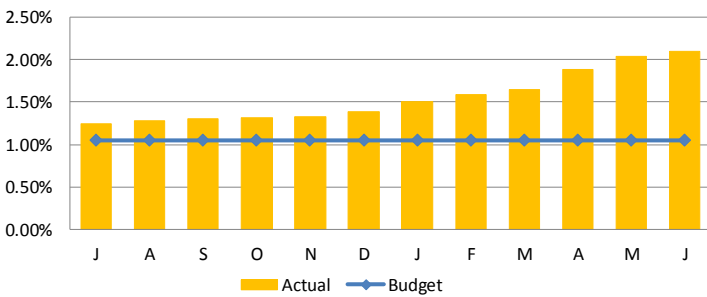


YTD Average Interest Rate Budgeted vs. Actual

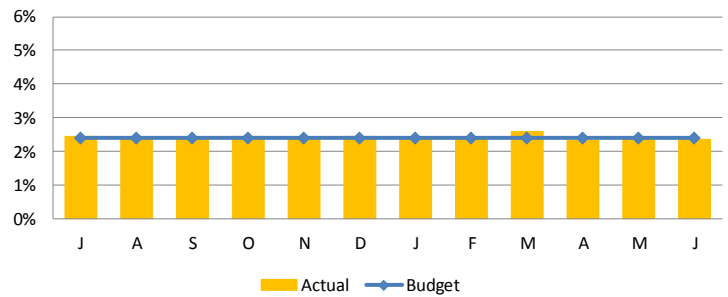


Monthly

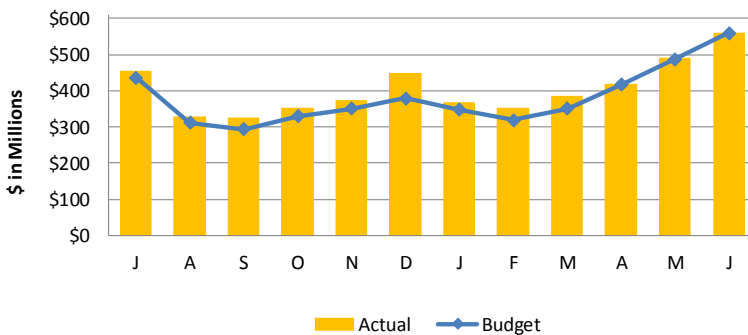
Short -Term Interest Rates



Long -Term Interest Rates



Short-Term Average Balances



Long-Term Average Balances

