MASSACHUSETTS WATER RESOURCES AUTHORITY

Board of Directors Report

on

Key Indicators of MWRA Performance

for

Fourth Quarter FY2019

Q1	Q2	Q3	Q4

Frederick A. Laskey, Executive Director
David Coppes, Chief Operating Officer
September 18, 2019

Board of Directors Report on Key Indicators of MWRA Performance
Fourth Quarter FY19

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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.

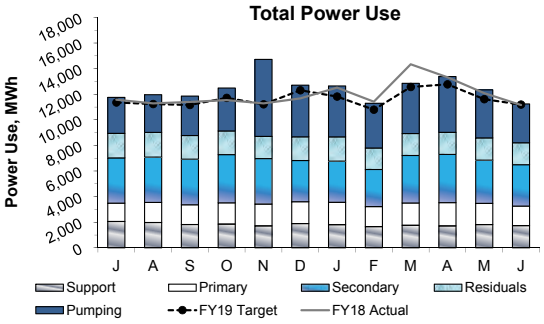
Frederick A. Laskey, Executive Director
David Coppes, Chief Operating Officer

September 18, 2019

OPERATIONS AND MAINTENANCE

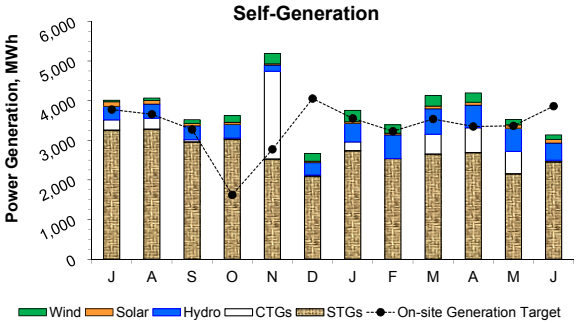
Deer Island Operations

4th Quarter - FY19

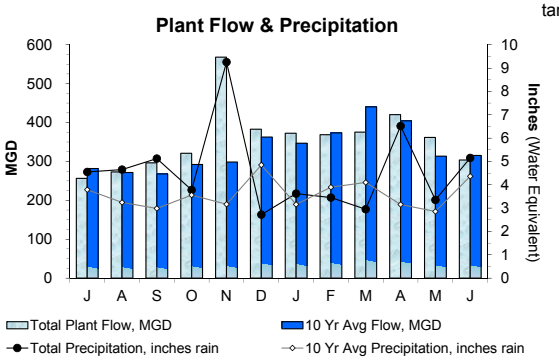


Total power usage in the 4th Quarter was 3.9% above target as Total Plant Flow was 4.2% above target with the 3 year average plant flow. As expected, power usage for raw wastewater pumping and for a number of plant processes were above target as a result of the higher plant flow. **Overall, total power usage in FY19 was 6.8% above target as total plant flow was 16.8% above the 3 year average plant flow target.**

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

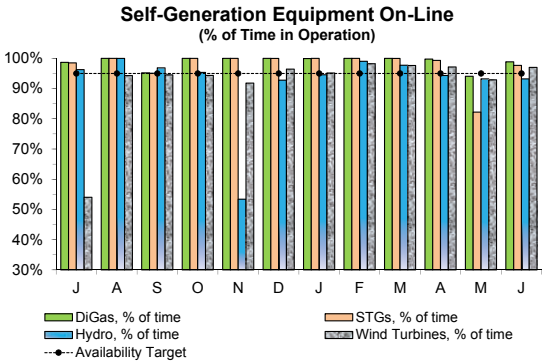


Power generated on-site during the 4th Quarter was 2.7% above target mainly due to higher-than-expected operation of the CTGs for nearly four (4) entire days in May to allow Eversource to perform work associated with the installation of the new power cable. As a result, power generated by the CTGs was more than two (2) times higher than expected. Power generated by the STGs was 6.6% below target due to both planned and unplanned maintenance shutdowns (for a control system interface upgrade and to repair a failed cross-tie bus bar in the Thermal Power Plant switchgear). Additionally, a problem with the STG prevented the operation of the steam system in vacuum mode, which would have allowed the BP-STG to produce an additional 1 MW of electricity during the month of June. While generation from the Hydro and Wind Turbines were both above target (10.1% and 5.8%, respectively), generation from the Solar Panels was 11.0% below target. **Overall, power generation was 12.9% above target for FY19.**

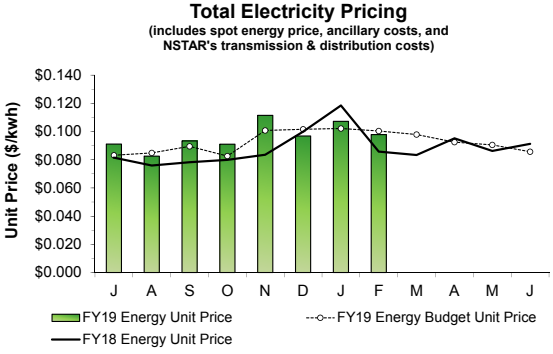


Total Plant Flow for the 4th Quarter was 5.1% above the budgeted 10 year average plant flow (361.9 MGD actual vs. 344.4 MGD expected) as precipitation was 44.8% above target (15.02 inches actual vs. 10.37 inches expected). Total Plant Flow was also 4.2% higher than the 3 year average plant flow used for energy budget projections. **Total Plant Flow in FY19 was 8.4% above target as precipitation was 27.8% above target.**

Note: Plant Flow and precipitation projections are based on 10 year averages but are 3 year averages for the energy budget projections.

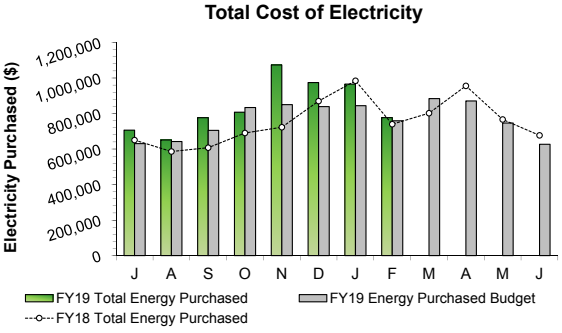


The DiGas system and Wind Turbines exceeded the 95% availability target for the 4th Quarter. The STGs fell below the 95% availability target due to a scheduled shutdown in the Thermal Power Plant (TPP) in May and an unanticipated failure of the cross-tie bus bar in the TPP that prevented operation of the STGs from May 26 to the afternoon of May 30. The Hydro Turbines fell below target due to several short maintenance required shutdowns, as well as extremely high plant flows during significant rain events which prevented hydro turbine operation.



Under the current energy supply contract, a block portion of DI's energy is a fixed rate and the variable load above the block is purchased in real time. The actual Total Energy Unit Price in February (the most current invoice available) was 2.5% below target with budgetary estimates. The actual total energy unit prices in March, April, May, and June are not yet available as the complete invoices have not been received. The Total Energy Unit Price includes a fixed block price, spot energy price, transmission & distribution charges, and ancillary charges.

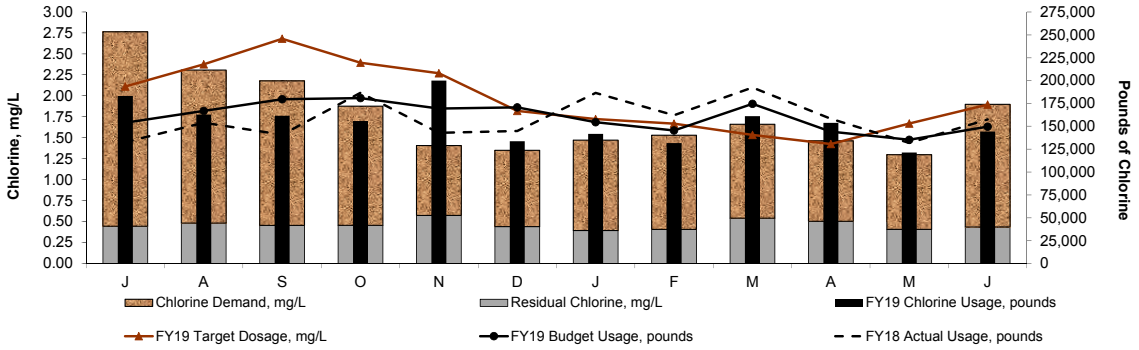
Note: Only the actual energy prices are reported. Therefore, the dataset lags by four (4) months due to the timing of invoice receipt and review.



The Electricity cost data for Electricity Purchased in March, April, May, and June are not yet available. Year-to-date Total Cost of Electricity is $628,237 (10.3%) higher than budgeted through February as the Total Energy Unit Price and the Total Electricity Purchased were both higher than target by 3.5% and 5.8%.

Note: Only months with complete Electricity Purchased data are reported. Therefore, the dataset lags by four (4) months due to the timing of invoice receipt and review.

Deer Island Sodium Hypochlorite Use



The disinfection dosing rate in the 4th Quarter was 6.6% below budgetary target estimates. Actual sodium hypochlorite usage in pounds of chlorine was also 2.2% lower than expected. The lower sodium hypochlorite dosage and usage is indicative of a lower chlorine demand in the wastewater. DITP maintained an average disinfection chlorine residual of 0.45 mg/L this quarter with an average dosing rate of 1.55 mg/L (as chlorine demand was 1.10 mg/L). **Overall in FY19, disinfection dosing was 10% below target and sodium hypochlorite usage in pounds of chlorine was 3.8% 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	1	1	0	99.5%	6.02
A	1	1	0	99.9%	2.96
S	2	2	0	99.4%	7.81
O	3	3	0	99.5%	9.58
N	12	12	0	96.2%	100.05
D	2	2	0	99.9%	4.39
J	1	1	0	98.9%	12.37
F	0	0	0	100.0%	0.00
M	0	0	0	100.0%	0.00
A	4	4	0	97.9%	45.42
M	1	1	0	99.97%	1.49
J	1	1	0	99.96%	1.79
Total	28	28	0	99.1%	191.89

99.2% of all flows were treated at full secondary during the 4th Quarter. There were six (6) secondary blending events due to high plant flow resulting from heavy rain. These blending events resulted in a total of 48.71 hours of blending and 265.63 MGal of primary-only treated effluent with secondary effluent. The Maximum Secondary Capacity for the entire quarter was 700 MGD.

Overall in FY19, 99.1% of all flows were treated at full secondary. There were a total of 28 separate secondary blending events in FY19; all due to high plant flows resulting from heavy rain, on occasion in combination with significant snow melt during the winter and spring. These secondary blending events combined produced a total of 191.89 hours of blending and 1,204.26 MGal of flow blended with secondary effluent.

Secondary permit limits were met at all times during the 4th Quarter.

Deer Island Operations & Maintenance Report

Environmental/Pumping:
The plant achieved an instantaneous peak flow rate of 1,165.1 MGD midday on April 22. This peak flow occurred during a storm event that brought 2.51 inches of rain to the metropolitan Boston area. Overall, Total Plant Flow in the 4th Quarter was 5.1% above the 10 year average plant flow target for the quarter.

Cleaning of the North Main Pump Station (NMPS) riser shafts began in April and continued into May. The ten-foot diameter North Metropolitan Relief Tunnel riser shaft and the eleven-foot diameter Boston Main Drainage Tunnel riser shaft were both cleaned out. A total of 13.09 tons of material was removed and disposed 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.

Work on the Winthrop Terminal Facility (WTF) VFD (Variable Frequency Drive) and Synchronous Motor Replacement project was started by the contractor in 2018 and entails the demolition of existing older obsolete equipment (electrical systems, motors and VFDs on each of the six (6) raw wastewater pumps). 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 and all performance testing were successfully completed for WTF Pump #2 in June. The contractor began working on WTF Pump #5 on June 10. To date, work has been completed on two (2) of the six (6) pumps (#6 and #2).

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 Cryogenic Oxygen Facility. Train #1 was in operation and Train #2 remained in operation as well for most of the turnaround maintenance activities, but was taken out of service for portions of the maintenance that required the train to be offline. The same turnaround maintenance will be performed on Train #1 in the fall.

Deer Island Operations & Maintenance Report (continued)

Residuals Treatment:
The rehabilitation of Gravity Thickener #1 under the major Gravity Thickener Rehabilitation project was completed in June and Gravity Thickener #2 was turned over to the contractors to begin work on June 17. The contractor also replaced the odor control dampers for several Gravity Thickeners in April with more to be replaced after the summer. This rehabilitation project will upgrade all six (6) gravity thickeners including complete replacement of each tank's sludge and scum thickening equipment as well as replacement of five (5) of the six (6) FRP dome covers (the FRP domed cover for Gravity Thickener #2 has already been replaced). The entire rehabilitation project is anticipated to take nearly three (3) years to complete.

Odor Control:
Activated carbon in carbon adsorber (CAD) unit #1 in the North Pumping Odor Control (NPOC) Facility, unit #2 in the East Odor Control (EOC) Facility, and unit #3 in the West Odor Control (WOC) Facility was changed out in May as part of routine practice to replace spent carbon.

Energy and Thermal Power Plant:
Overall, total power generated on-site accounted for 29.4% of Deer Island's total power use for the quarter and 30.3% for FY19. Renewable power generated on-site (by Solar, Wind, STGs, and Hydro Turbines) accounted for 26.0% of Deer Island's total electrical power use for the quarter and 27.0% for FY19.

Progress on the installation for the new cross-harbor power cable continued through the quarter. This new cross-harbor power cable will replace the existing cross-harbor power cable that serves as the primary means of transmitting electricity to Deer Island, and is expected to be available near the end of this year. On April 11, DITP was taken off utility power for nearly 20 hours to allow Eversource to complete equipment installation at their K-Street location (Station 385). The CTGs were operated during this time to supply power to Deer Island. Also, the Eversource contractor completed the placement of the cable across Boston Harbor on April 28, when the new power cable was pulled from the Conley Terminal in Boston and reached Deer Island. In May and June, electrical switchgear upgrade work took place for both electrical buses within Eversource Station 132 on Deer Island. Power feed from each electrical bus to Deer Island was suspended by the utility at separate times to allow upgrade of the transformer and associated equipment for each electrical bus.

DITP experienced two (2) separate unanticipated partial plant power outages on the morning of May 26 and on the evening of May 27. The event on May 26 occurred as a result of a ground fault issue which caused the cross-tie bus bar located within the Thermal Power Plant to fail, tripping offline a number of pieces of equipment in the plant. Wastewater pumping was impacted only briefly and plant flow never completely stopped as the partial power loss only caused some pumps to trip offline. All other impacted equipment in the plant was subsequently restarted. The failed cross-tie bus bar however did prevent power from the single B-Bus feed from Eversource Station 132 (due to the Eversource work in progress) to be distributed to the plant’s A-Bus. CTG-1A was placed into operation later in the day to power the plant’s A-Bus, while the Station 132 B-Bus feed continued to power the plant’s B-Bus. The failed cross-tie bus bar was repaired by staff and the unit approved for operation by the electrical contractor on May 30.

The partial power loss on May 27 occurred as a result of CTG-1A tripping offline while a voltage adjustment was being made during the operation of the CTG. This resulted in the unanticipated loss of power to the plant’s A-Bus causing some plant equipment to trip offline. Again, wastewater pumping was impacted only briefly and never completely stopped as the partial power loss only caused some pumps to trip offline. CTG-1A was restarted to restore power to the plant’s A-Bus. DITP remained in this configuration until Eversource completed this portion of work on June 6. CTG-1A was then taken offline and DITP returned to normal electrical configuration. No untreated wastewater was released at the Massachusetts Bay outfall during these events. There were no treated or untreated discharges from combined sewer overflows and no sanitary sewer overflows as a result of these events. No secondary process bypass occurred during these power failures. All sampling and test results from this time period indicate compliance with NPDES permitted effluent limits.

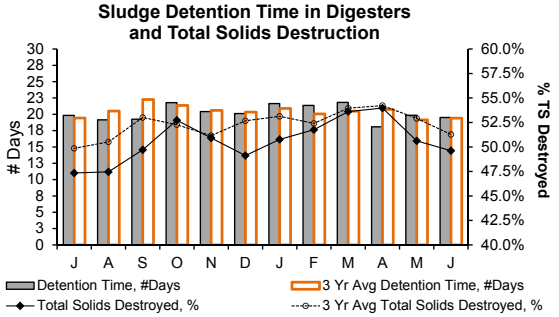
CTG-1A was operated for approximately two (2) hours on June 18 for an ISO-New England declared Demand Response summer audit event.

DITP took delivery of 420,000 gallons of #2 fuel oil, a total of 42 oil tanker trucks, without incident from April 16 through April 24. 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.

Other items:
The Human Machine Interface (HMI) for DITP’s Process Instrumentation and Controls System (PICS) was installed in 2011-2012 and was due for upgrade. The Notice To Proceed for this upgrade project was given to the HMI contractor in November 2018 and the preparatory work was performed at the contractor's facility since that time. The onsite upgrade work began this April with the anticipated completion to occur by the end of summer. This upgrade will provide the HMI system with the latest hardware, system software, and HMI system software. The plant's control system was unaffected by this upgrade work and the control of plant operational systems continued mostly as normal as the HMI upgrade was completed in phases. This upgrade solely impacts the HMI portion of the system, which is the computer interface part of the system that provides plant operational information to the operator and allows the operator to make operational changes from a workstation. The HMI upgrade in the Thermal Power Plant (TPP) on May 21 required a one (1) day shutdown of the boiler and the steam turbines. Staff, along with contractors, took this opportunity to perform a number of other essential maintenance projects, which could only be completed during a TPP shutdown, including the annual cleaning of the dump condenser. The majority of the onsite HMI upgrade work was completed by the end of May. Staff and the HMI contractor continue to work on punchlist items and additional ancillary scheduled upgrade work continues into July.

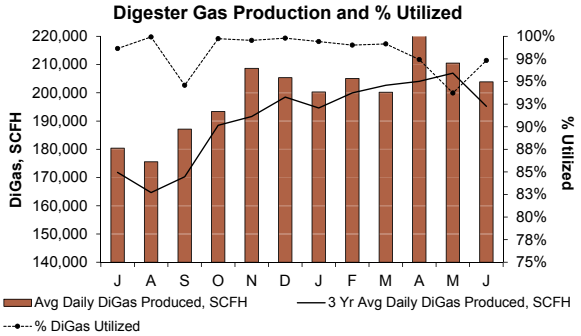
Clinton Treatment Plant:
Maintenance staff replaced the upper and lower belts on #1 Belt Filter Press, replaced rotor and stator on #1 Belt Filter Press Sludge Feed Pump, replaced #3 Waste Activated Sludge pump, and reinstalled the temporary Sodium Bisulfite Feed System. North and South Chlorine Contact Channels were drained, cleaned, and inspected.

Clinton WWTP operated Phosphorus Reduction Facility with acceptable results for Fourth Quarter FY19. The pH meter on #1 train was calibrated in April. All three Disk Filters, troughs and nozzles were cleaned and inspected. In May, all three Disk filters were acid washed. Staff cleaned all three Disk Filters troughs and checked all nozzles in June.



Total solids (TS) destruction following anaerobic sludge digestion averaged 51.4% during the 4th Quarter, 2.7% below the 3 year average of 52.8%, as the sludge detention time in the digesters was 3.1% below target at 19.1 days. DI operated with an average of 8.0 digesters similar to the 3 year average. **Overall in FY19, TS destruction averaged 50.6%, which was 3.2% lower than the 3 year average of 52.3%. Sludge detention time was 20.2 days, similar to the 3 year average of 20.4 days.**

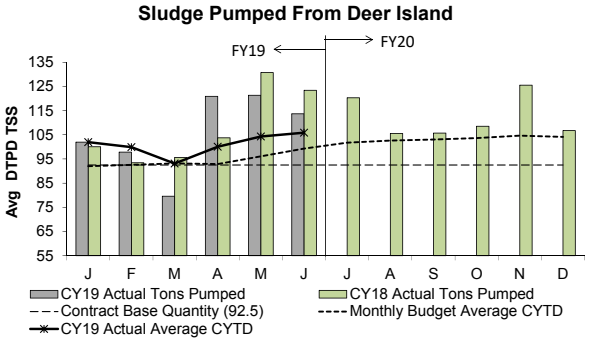
Total solids (TS) destruction is dependent on sludge detention time which is determined by primary and secondary solids production, plant flow, and the number of active digesters in operation. Solids destruction is also significanty impacted by changes in the number of digesters and the resulting shifting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



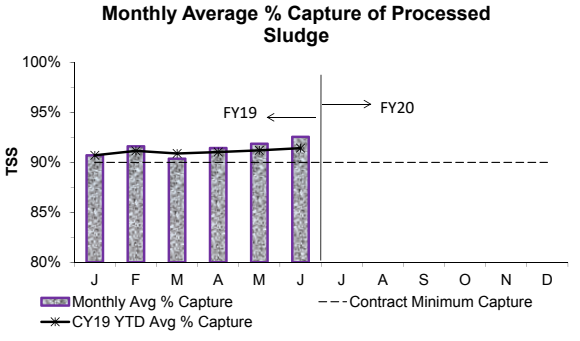
The Avg Daily DiGas Production in the 4th Quarter was 6.0% above target with the 3 Year Avg Daily DiGas Production. On average, 96.2% of all the DiGas produced in the quarter was utilized at the Thermal Power Plant (TPP). The slightly lower Digas usage was due to a TPP maintenance shutdown and two (2) separate unanticipated partial plant power outages on May 26 and on May 27 that caused the DiGas system and boiler to trip offline. Additionally, there were periods during the quarter when Digas production exceeded the capacity of the TPP. **Overall in FY19, the Avg Daily DiGas Production was 4.8% above target, with an average of 98.2% utilization of DiGas at the Thermal Power Plant.**

Residuals Pellet Plant

New England Fertilizer Company (NEFCO) operates the MWRA Biosolids Processing Facility (BPF) in Quincy under contract. 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. On average, MWRA processes more than 92.5 DTPD/TSS each year (FY19's budget is 98.9 DTPD/TSS and FY20's budget is 107.4 DTPD/TSS).

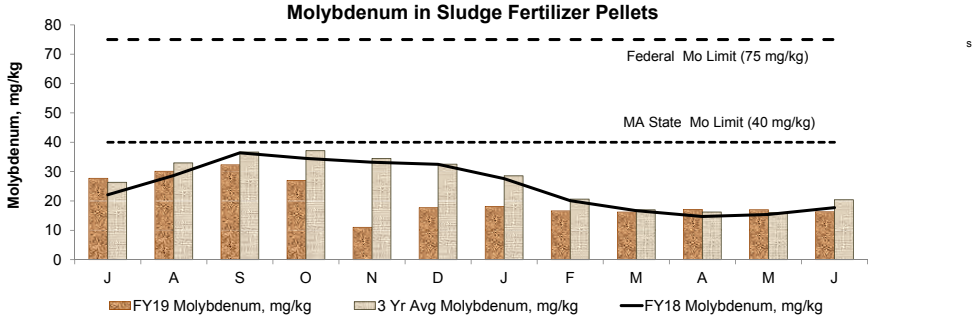


The average quantity of sludge pumped to the Biosolids Processing Facility (BPF) in the 4th Quarter was 118.6 TSS Dry Tons Per Day (DTPD) - 12.5% above target with the FY19 budget of 105.5 TSS DTPD for the same period. Sludge delivered to the BPF was higher than expected in April and May but was lower than expected in June. The higher sludge pumped to the BPF is partly due to higher sludge and solids content and the resulting lower solids destruction.



The contract requires NEFCO to capture at least 90.0% of the solids delivered to the Biosolids Processing Facility. The average capture for the 4th Quarter was 92.0% and the CY19 to date average capture is 91.4%.

The CY19 average quantity of sludge pumped through June is 105.9 DTPD - 6.6% above target, compared with the CY19 average budget of 99.3 DTPD for the same time period.



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.

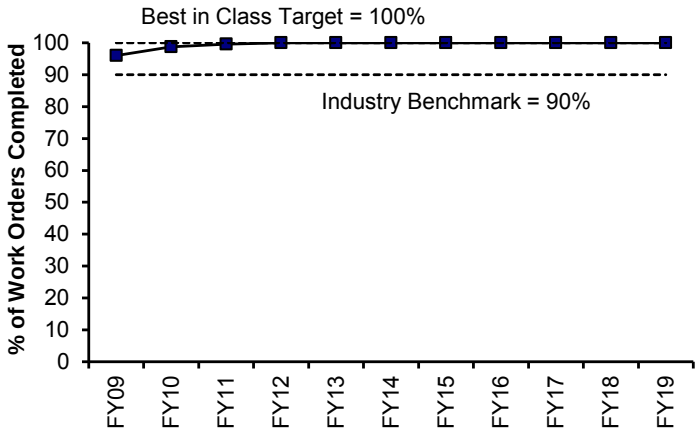
The levels have been below the DEP Type 1 limit for all three (3) metals. For Mo, the level in the MWRA sludge fertilizer pellets during the 4th Quarter averaged 16.8 mg/kg, 4% below the 3 year average, 58% below the MA State Limit, and 78% below the Federal Limit.

Deer Island Yearly Maintenance Metrics

4th Quarter - FY19

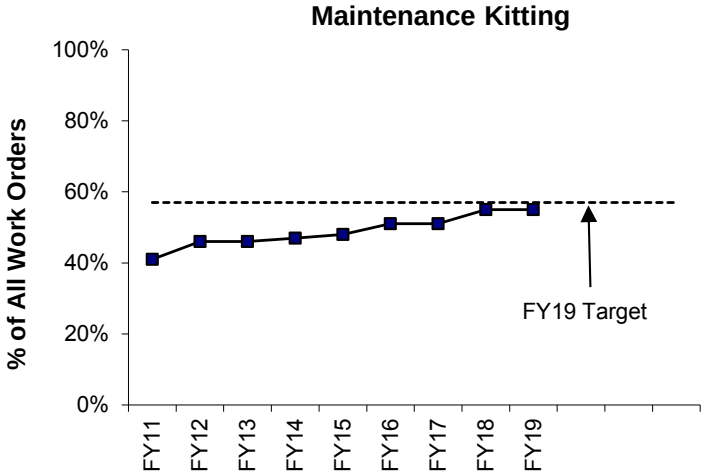
Proactive and Productivity Measures

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 FY19.

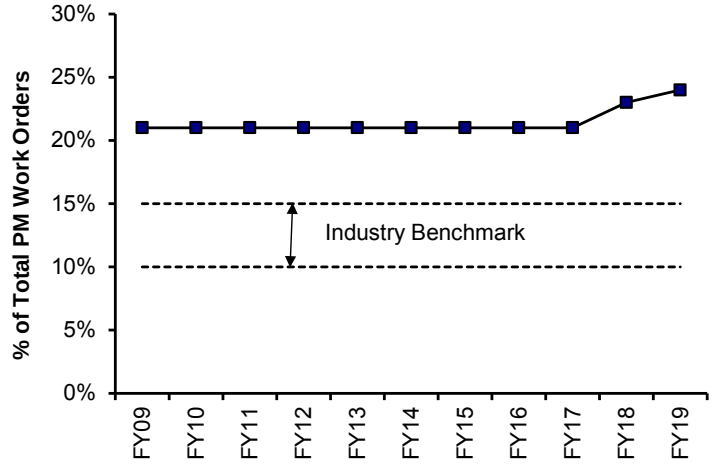
Maintenance Kitting



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.

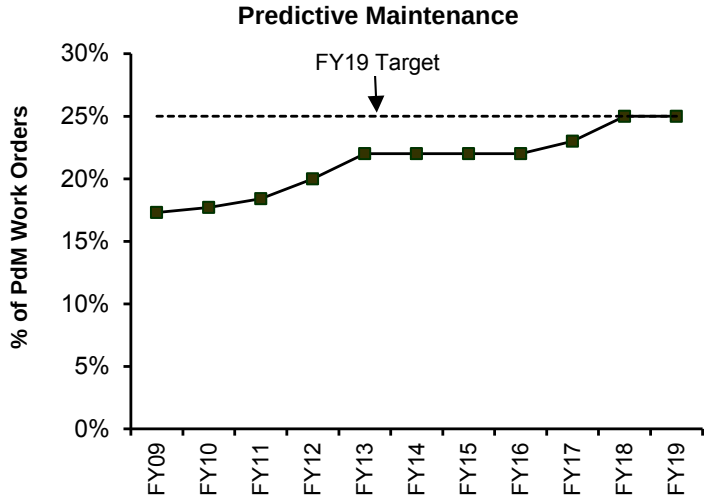
Kitting allows maintenance staff to spend more time "turning the wrench" and less time waiting for parts at the stockroom window. Kitting for FY19 was 55%, just shy of DITP's new goal of 57%.

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 24% in FY19. DITP reached the industry benchmark range of 10-15% in April 2003 and has exceeded the goal through FY19. Operations completes approximately 650 PM work orders per month.

Predictive Maintenance

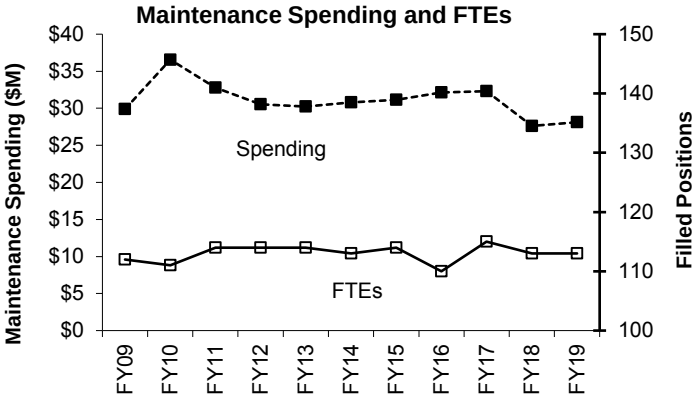


Predictive maintenance has steadily increased from 2% in FY03 to 25% in FY19, reaching DITP's FY19 new goal of 25%. The increase in predictive maintenance was achieved through the expanded use of lubrication, vibration, thermography, and acoustic ultrasonic testing techniques. The Condition Monitoring Group continually reviews and investigates new opportunities and initiatives to expand condition monitoring testing and analysis.

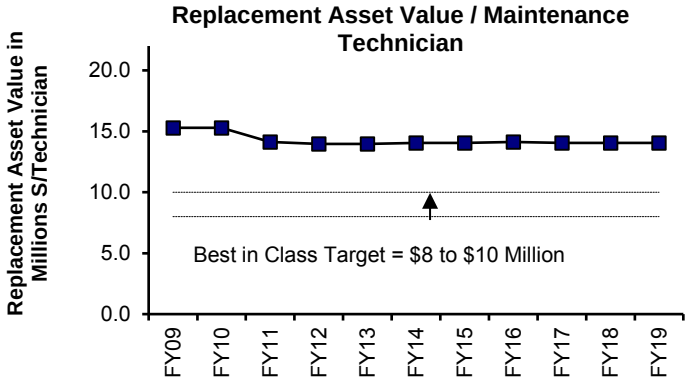
Deer Island Yearly Maintenance Metrics

4th Quarter - FY19

Overall Maintenance Program Measures

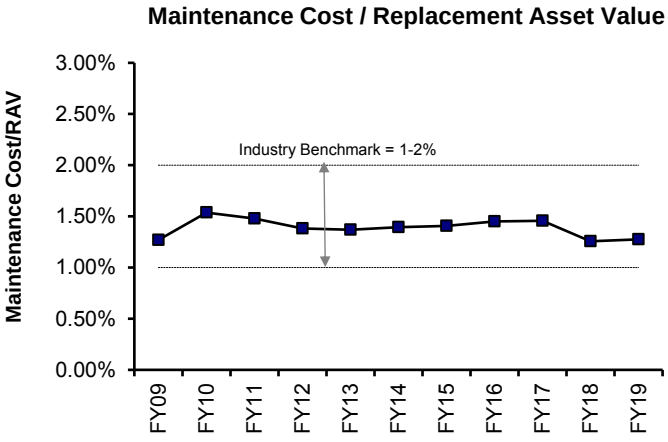


DITP's Maintenance staff is currently at 113 FTE's. Maintenance has been successful in meeting its goals through implementation of numerous maintenance efficiencies including: Operations staff performing light maintenance, cross-functional training and flexibility, and Reliability-Centered Maintenance.

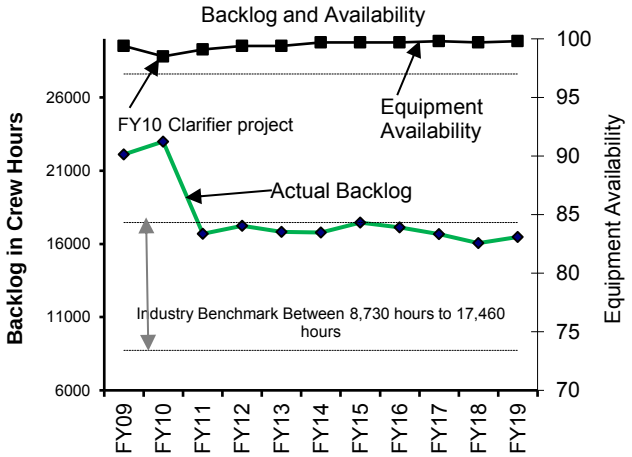


DITP adopted a "best in class" target of $8-$10 Million/Technician for maintenance staffing. Even after a period of downward trending, DITP remains above this Best in Class target range. However, as the plant ages and additional equipment replacements are expected, DITP management will reassess staffing 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 FY19, overall spending increased slightly from FY18 due to some large Maintenance Projects; Winthrop Terminal Facility VFD/Motor Replacements, Gravity Thickener #1 Rebuild, MCC Switchgear Replacements, Scum Hopper Rebuilds, Exterior Door Contract and PICS Upgrades.



The industry benchmark for annual maintenance spending is between 1% to 2% of replacement asset value, currently DITP is at 1.28%. 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 $13.6 million coupled with CIP spending.



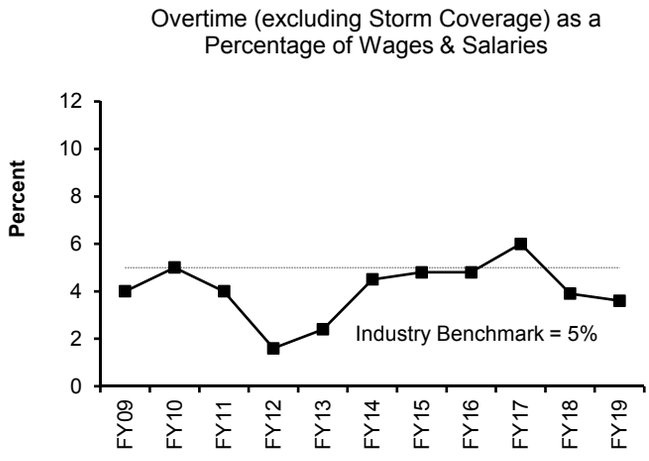
Industry benchmark for Equipment Availability is 97% and over the last ten years, equipment availability has consistently exceeded the benchmark. In FY19 the availability was 99.8%. The slight increase in Equipment Availability during FY19 was due to redundancy of equipment and effective/efficient maintenance practices. 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 FY19 was 16,480 hours, which is within the industry benchmark. The slight increase in Backlog is due to difficulty hiring trade staff.

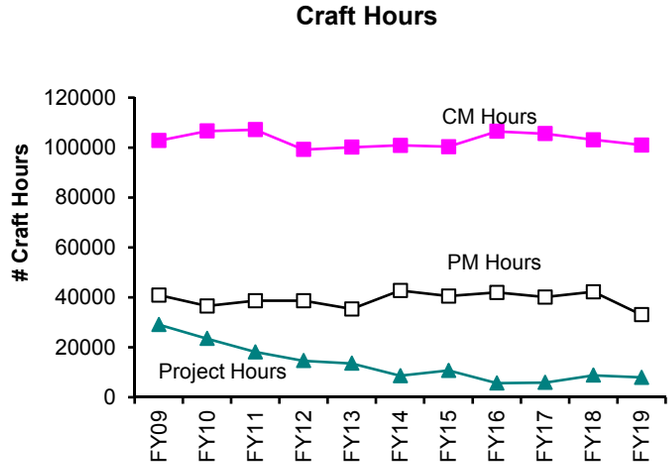
Deer Island Yearly Maintenance Metrics

4th Quarter - FY19

Overall Maintenance Program Measures (cont.)

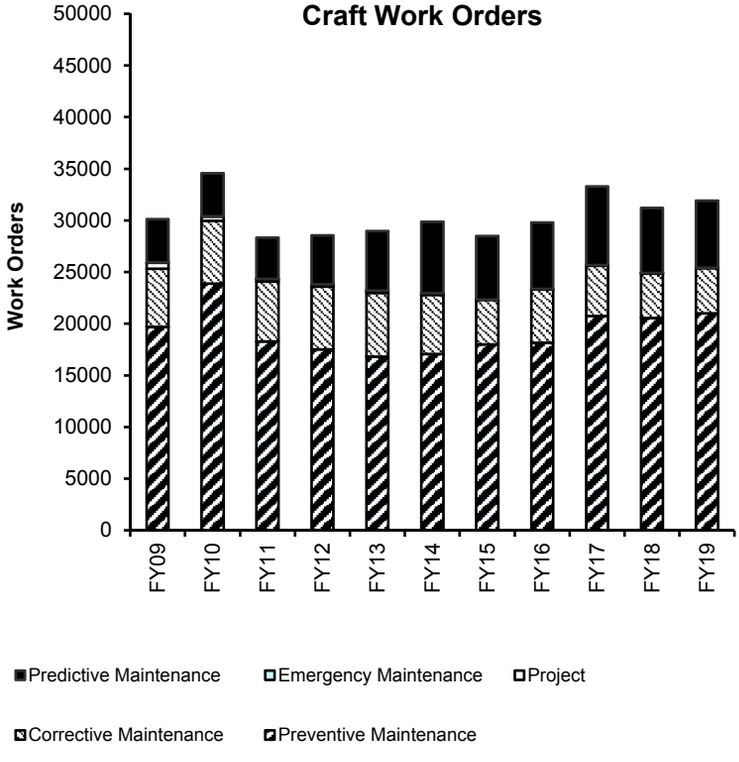


Management continues its effort to keep overtime below the industry benchmark. DITP maintenance overtime was 3.6% for FY19. Management has taken steps to reduce overtime spending by limiting overtime to repair critical equipment and systems only. DITP has been on or under Industry Benchmark every year except FY17, due to the increase in overtime for the Eversource Cable Outage.



Continued optimization of the Preventive Maintenance (PM) program through the transfer of some light maintenance tasks from Maintenance to Operations staff (increased to 24% of PM work orders in FY19), elimination of duplicate work orders, combining some PM's, increasing PM frequency due to equipment history and performance has resulted in a decrease in PM hours in FY19.

Corrective Maintenance (CM) hours slightly decreased from last year. Project Maintenance hours slightly decreased due to a number of CIP projects being completed: Winthrop Terminal Facility VFD\Motor Rebuilds, Gravity Thickener #1 Rebuild, MCC Switchgear Replacements, Scum Hopper Rebuilds, and Exterior Door Contract.



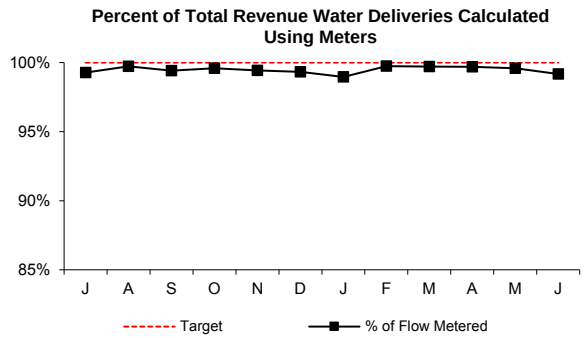
During FY19, the number of work orders increased by 495 from the previous year. The increase in work orders was due to Planning Department entering new equipment (Operational Valves, Scum Hoppers, VFD Replacements, etc.) and setting up PM/PdM schedules, including increased visual inspections to identify issues at their onset. The number of Corrective Maintenance (CM) work orders increased slightly in FY19. Project (PROJ) work orders decreased for FY19 due to a number of CIP projects 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

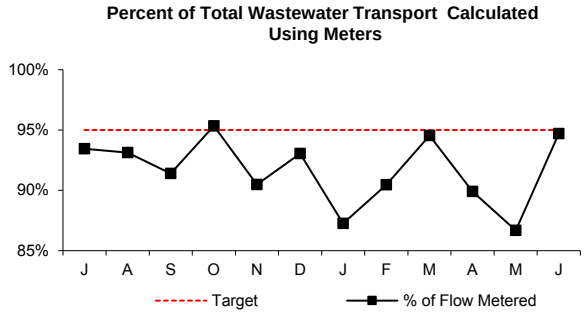
4th Quarter - FY19

WATER METERS



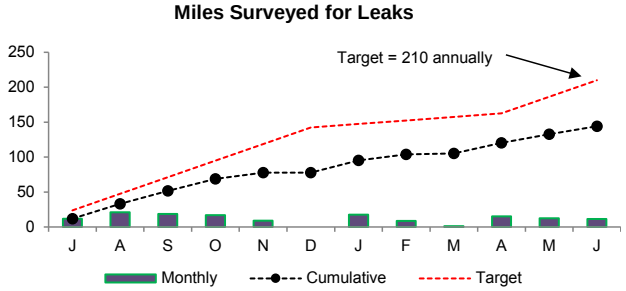
The target for revenue water deliveries calculated using meters is 100%. Estimates are generated for meters that are out of service due to instrumentation problems or in-house and capital construction projects. During the 4th Quarter, meter actuals accounted for 99.49% of flow; only 0.51% of total revenue water deliveries were estimated. The following is the breakdown of reasons for estimations:
In-house and Capital Construction Projects - 0.15%
Instrumentation Failure - 0.36%

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 data. Estimates are produced using data from previous time periods under similar flow conditions. During 4th Quarter of FY19, meter actuals accounted for 90.43% of flow. Meter BO-MI-1 malfunctioned between April 16th and May 9th. As meter BO-MI-1 records our largest system flow, it greatly affects our estimated flow percentage when it is down. High flow velocities in this pipe require a dive team to perform any repairs to ensure safety. The dip in system performance in April and May can be almost entirely attributed to this estimate.

WATER DISTRIBUTION SYSTEM PIPELINES



During the 4th Quarter, 38.99 miles of water mains were inspected. The total inspected for the fiscal year was 144.17

Leak Backlog Summary													
Month	J	A	S	O	N	D	J	F	M	A	M	J	Totals
Leaks Detected	1	4	4	1	0	1	3	2	1	1	1	1	20
Leaks Repaired	0	1	3	7	2	1	1	1	4	1	1	1	23
Backlog	10	13	14	8	6	6	8	9	6	6	6	6	n/a

During the 4th Quarter, three new leaks were detected, and three repaired. Refer to FY19 Leak Report below for details. Also, community assistance ranging from individual leak location to hydrant surveys were conducted for: Arlington, Belmont, Boston, Clinton, Lexington, Lynn, Malden, Medford, Nahant, Newton, Revere, Saugus, Stoneham, Swampscott, Waltham and Winchester.

4th Quarter - FY 19 Leak Report

Date Detected	Location of Leaks	Repaired
04/20/18	#634 Mystic Ave. @ Mt. Vernon, Somerville	08/03/18
07/16/18	683 Boylston St., @ Lee St. Brookline	09/11/18
09/03/18	#2 Lynn Fells Pkwy., exit. Stoneham	09/05/18
09/07/18	Waverly Oaks Road. Waltham	09/15/18
11/20/17	Peabody St. @ Washington St., Newton	10/24/18
11/26/17	Nonantum Rd. @ Maple St., Newton	10/24/18
08/01/18	Morton St. @ Forest Hills Ave., W. Roxbury	10/25/18
08/08/18	Morton St. @ Forest Hills Cemetary, W. Roxbury	10/31/18
09/21/18	Felton St. @ Water St., Waltham	10/02/18
09/27/18	Morton St. @ Norfolk St., Dorchester	10/31/18
10/20/18	Morton St. @ Norfolk St., #2, Dorchester	10/23/18
08/26/18	West St. @ Neponset River, Hyde Park	11/15/18
08/28/18	Morton St. @ Harvard St., Mattapan	11/19/18
12/16/18	Hicks Ave. @ Mystic Ave., Medford	12/17/18
01/02/19	Main St. @ Maddison St., Malden	01/09/19
01/25/19	#1105 Lexington St., Waltham/Lexington	02/14/19
02/19/19	Morton St. @ W. Main St., Mattapan	03/01/19
01/23/19	#286 Quinobequin Road, Newton	03/11/19
02/21/19	American Legion Highway, Mattapan	03/14/19
03/21/19	Alewife Brook Sewer P.S., Somerville	03/27/19
04/15/19	Broad Street, Section-56, Lynn	04/29/19
05/01/19	#9 & #11 Madison Street, Malden	05/13/19
06/06/19	#33 Lynn Fells Parkway, Saugus	06/10/19

Date Detected	Location of Leaks/Unrepaired
06/08/15	Allandale Rd. @ Grove St., Brookline, Sect 78, located acoustically. Not surfacing. No redundancy.
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 off 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. No redundancy.
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.

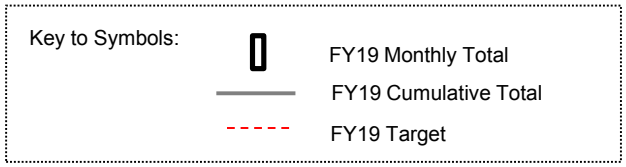
Water Distribution System Valves

4th Quarter - FY19

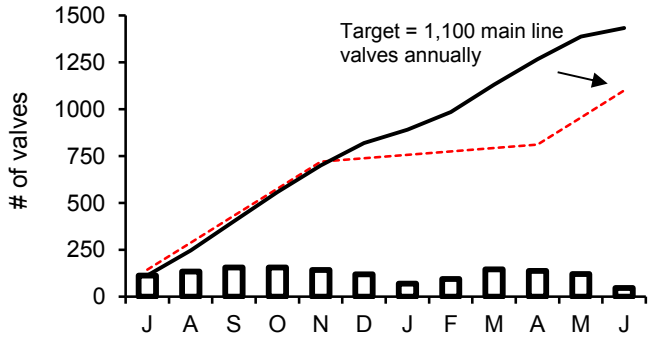
Background

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	
		FY19 to Date	FY19 Targets
Main Line Valves	2,159	96.8%	95%
Blow-Off Valves	1,317	98.6%	95%
Air Release Valves	1,380	95.1%	95%
Control Valves	49	100.0%	95%

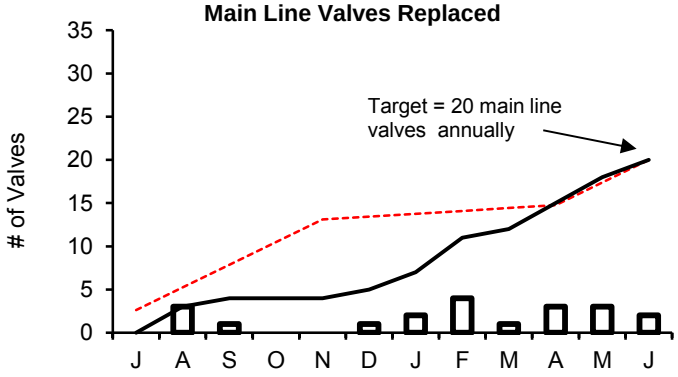


Main Line Valves Exercised



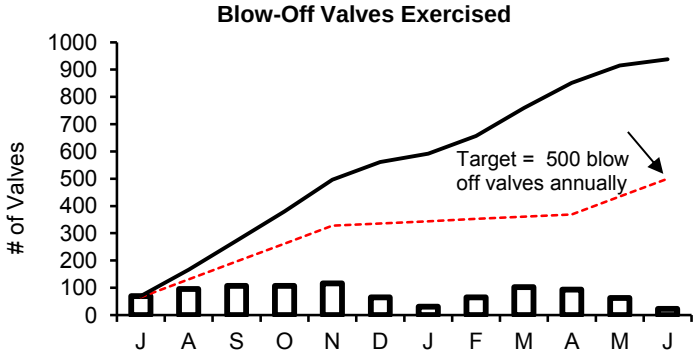
During the 4th Quarter of FY19, 303 main line valves were exercised. The total exercised for the fiscal year was 1,433. Main Line Valves Exercised have exceeded the target due to full staffing and CIP projects coming to completion.

Main Line Valves Replaced



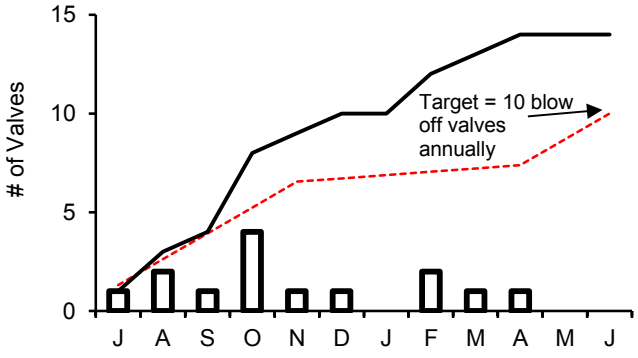
During the 4th Quarter of FY19, there were eight main line valves replaced. The total replaced for the fiscal year was twenty.

Blow-Off Valves Exercised



During the 4th Quarter of FY19, 179 blow off valves were exercised. The total exercised for the fiscal year was 938. Valve exercising has exceeded the target due to full staffing and CIP projects coming to completion.

Blow-Off Valves Replaced



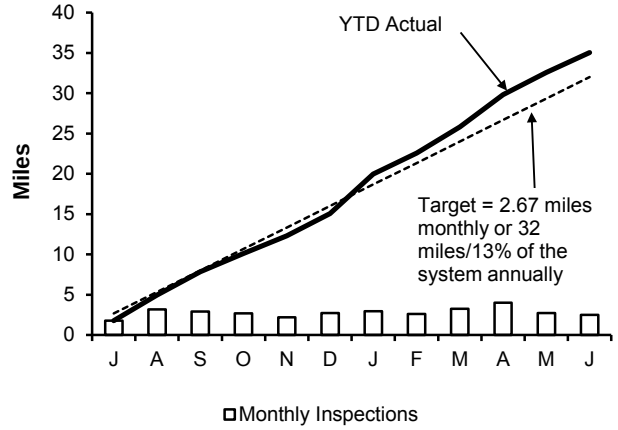
During the 4th Quarter of FY19, there was one blow off valve replaced. The total replaced for the fiscal year was fourteen. Blow off valve retrofit project schedules have been driven by requested community roadway reconstruction projects.

Wastewater Pipeline and Structure Inspections and Maintenance

4th Quarter - FY19

Inspections

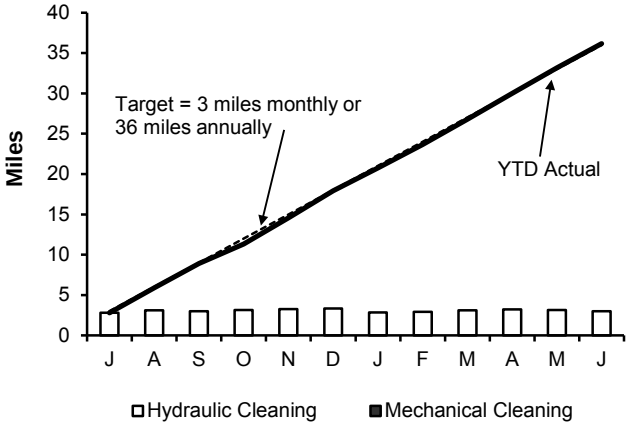
Pipeline Inspections



Staff internally inspected 8.79 miles of MWRA sewer pipeline during this quarter. The year to date total is 25.83 miles. No Community Assistance was provided this quarter.

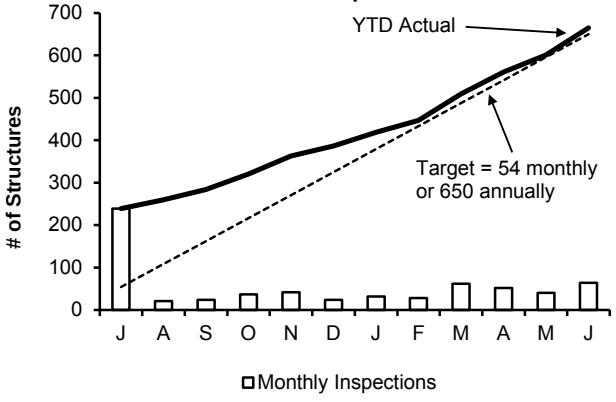
Maintenance

Pipeline Cleaning



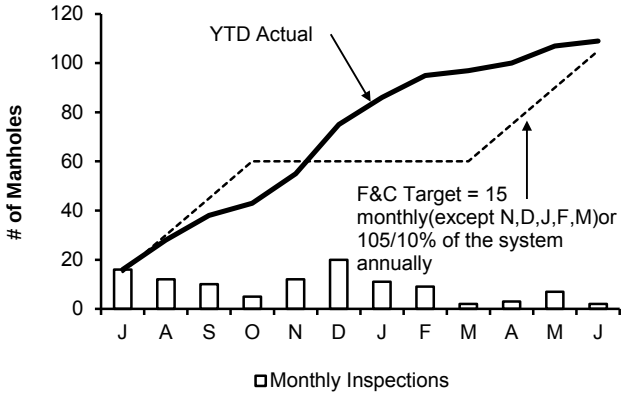
Staff cleaned 9.93 miles of MWRA's sewer system and removed 47 yards of grit and debris during this quarter.
The year to date total is 36.17 miles.
No Community Assistance was provided this quarter.

Structure Inspections



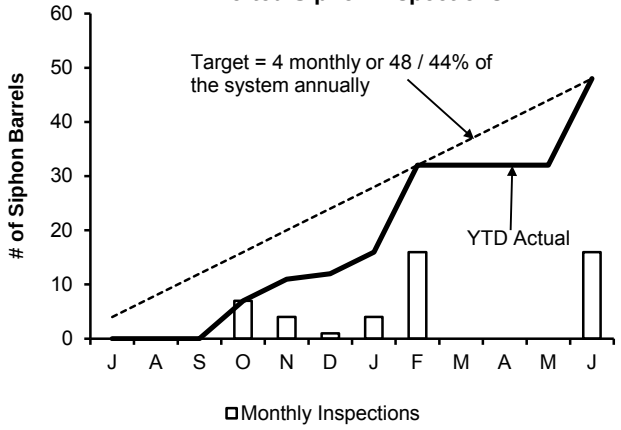
Staff inspected the 36 CSO structures and performed 86 additional manhole/structure inspections during this quarter.
The year to date total is 655 inspections.

Manhole Rehabilitation



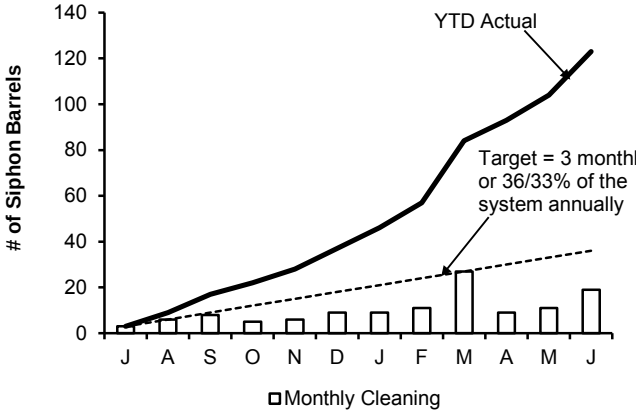
Staff replaced 12 frames & covers during this quarter.
The year to date total is 109.

Inverted Siphon Inspections



Staff inspected 20 siphon barrels this quarter.
Year to date total is 32 inspections.

Inverted Siphon Cleaning

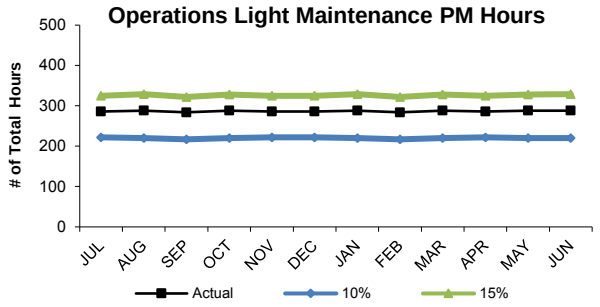


Staff cleaned 39 siphon barrels during this quarter.
Year to date total is 123.

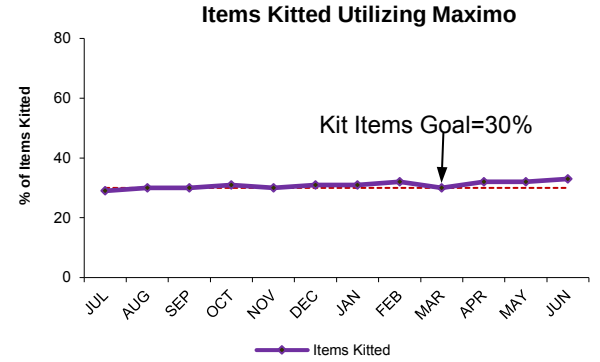
Field Operations' Metropolitan Equipment & Facility Maintenance

4th Quarter - FY19

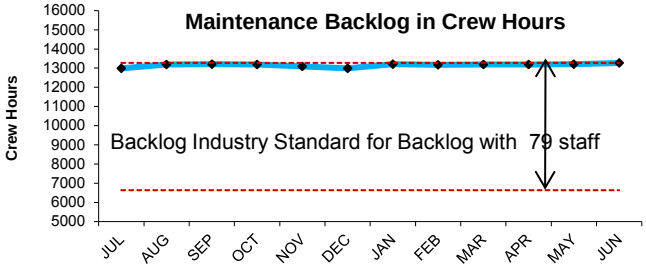
Several maintenance and productivity initiatives are in progress. The goal for the Overall PM completion and the Operator PM completion was raised to 100% for Fiscal Year 2010. The Operator PM and kitting initiatives frees up maintenance staff to perform corrective maintenance and project work, thus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



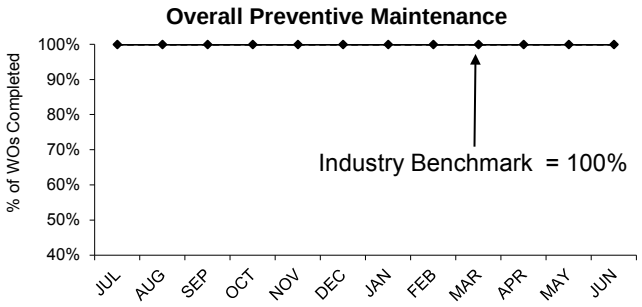
Operations staff averaged 287 hours of preventive maintenance during the 4th Quarter, an average of 13% of the total PM hours for the 4th Quarter, which is within the industry benchmark of 10% to 15%.



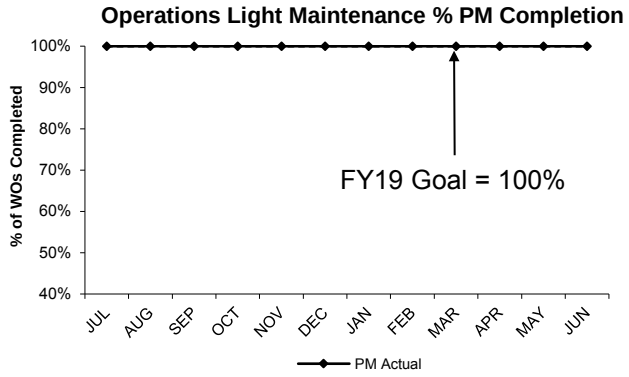
Operation's FY19 maintenance kitting goal has been set at 30% of all work orders to be kitted. Kitting is the staging of parts or material neccesary to complete maintenance work. In the 4th Quarter, 32% of all applicable work orders were kitted. This resulted in more wrench time and increased productivity.



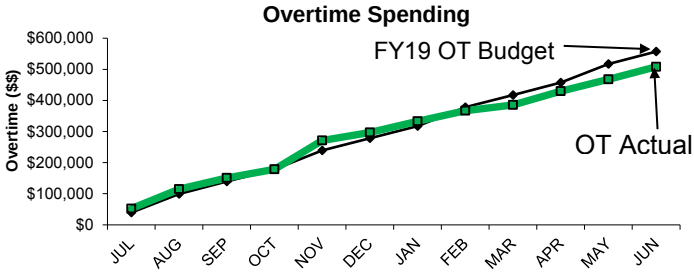
The 4th Quarter backlog average is 13224 hours. Management's goal is to continue to control overtime and still stay within the industry benchmark of 6636 to 13275 hours.



The Field Operations Department (FOD) preventive maintenance goal for FY19 is 100% of all PM work orders. Staff completed an average of 100% of all PM work orders in the 4th Quarter.



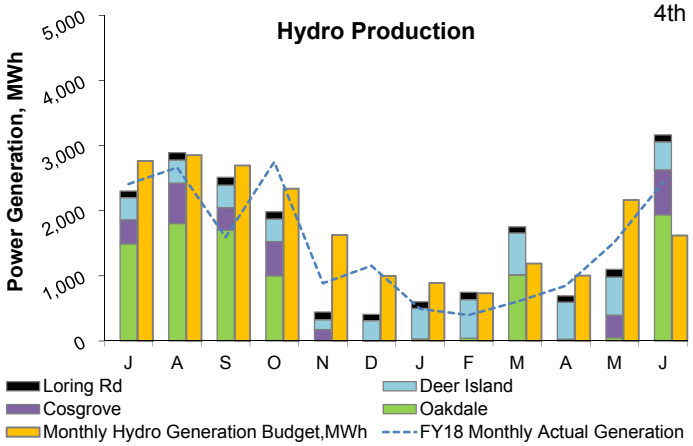
Wastewater Operators complete light maintenance PM's which frees up maintenance staff to perform corrective maintenance. Operations' FY19 PM goal is completion of 100% of all PM work orders assigned. Operations completed an average of 100% of PM work orders in the 4th Quarter.



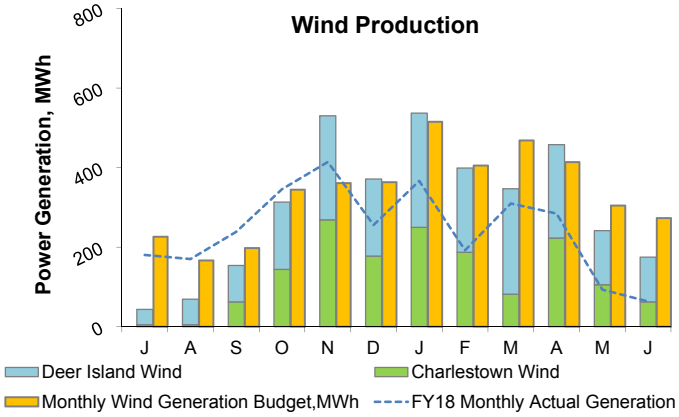
Maintenance overtime was $20k under budget for the 4th Quarter. Overtime was used for critical maintenance repairs and wet weather events. Overtime for FY19 was $508k which was $49k under budget for the fiscal year.

Renewable Electricity Generation: Savings and Revenue

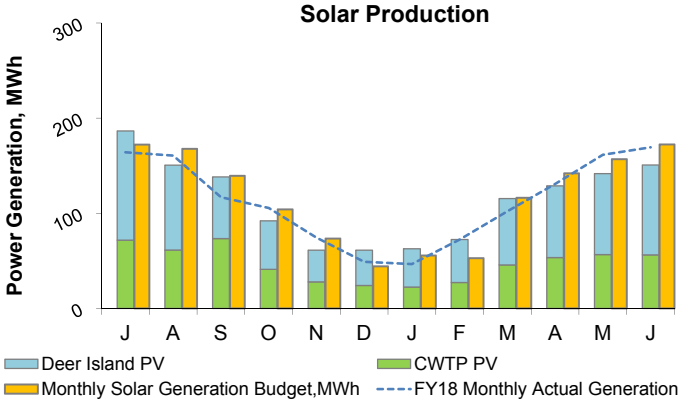
4th Quarter - FY19



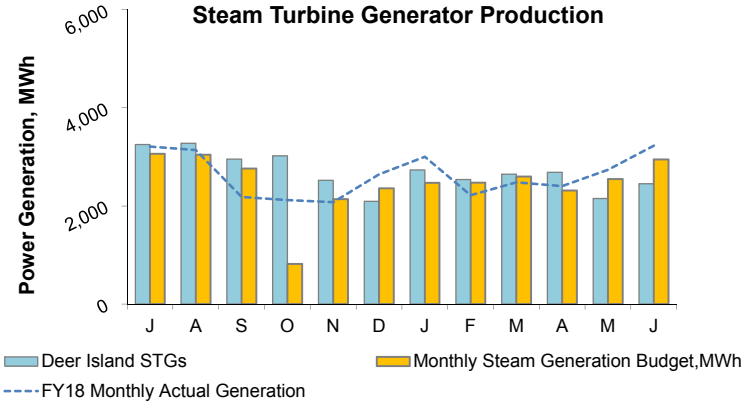
In the 4th Quarter, the renewable energy produced from all hydro turbines totaled 4,958 MWh; 4% above budget[3] . The total energy produced to date in FY19 is 18,609 MWh; 11% below budget[3] primarily due to Cosgrove generation values having been underestimated by the utility company and Oakdale being offline. The utility data for Cosgrove is typically corrected and reconciled in later months of the year. The total savings and revenue[2] to date in FY19 (actuals through February[1]) is $786,414; 4% below budget[3]. The savings and revenue value does not include RPS REC revenue (see next page).



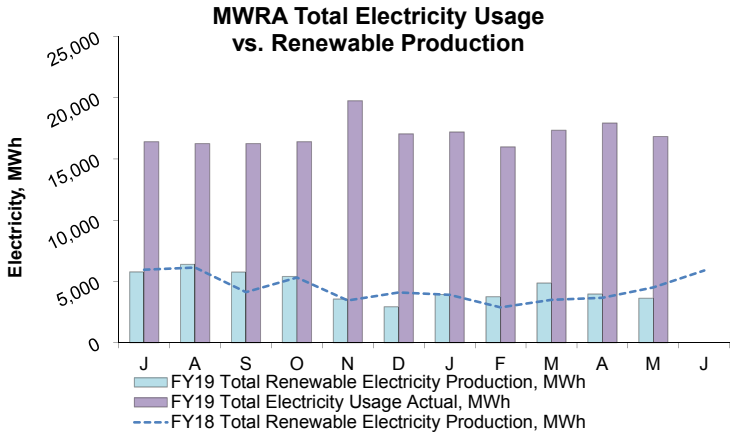
In the 4th Quarter, the renewable energy produced from all wind turbines totaled 874 MWh; 12% below budget[3]. The total energy produced to date in FY19 is 3,638 MWh; 10% below budget[3], mostly due to Charlestown Wind generation values being underestimated by the utility company. The total savings and revenue[2] to date in FY19 (actuals through February[1]) is $363,530; 5% above budget[3]. The savings and revenue value does not include RPS REC revenue (see next page).

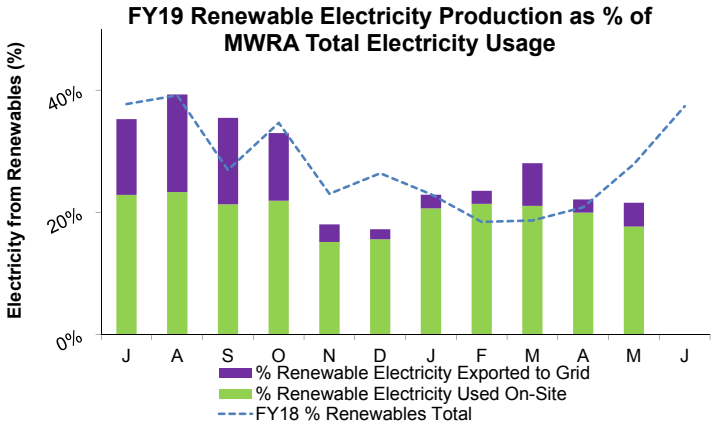


In the 4th Quarter, the renewable energy produced from all solar PV systems totaled 421 MWh; 11% below budget[3]. The total energy produced to date in FY19 is 1,361 MWh; 3% below budget[3]. The total savings and revenue[2] to date in FY19 (actuals through February[1]) is $109,161; 12% above budget[3]. The savings and revenue value does not include RPS REC revenue (see next page).



In the 4th Quarter, the renewable energy produced from all steam turbine generators totaled 7,291 MWh; 7% below budget[3]. The total energy produced to date in FY19 is 32,342 MWh; 9% above budget[3]. The total savings and revenue[2] to date in FY19 (actuals through February[1]) is $2,143,221; 27% above budget[3]. The savings and revenue value does not include RPS REC revenue (see next page).



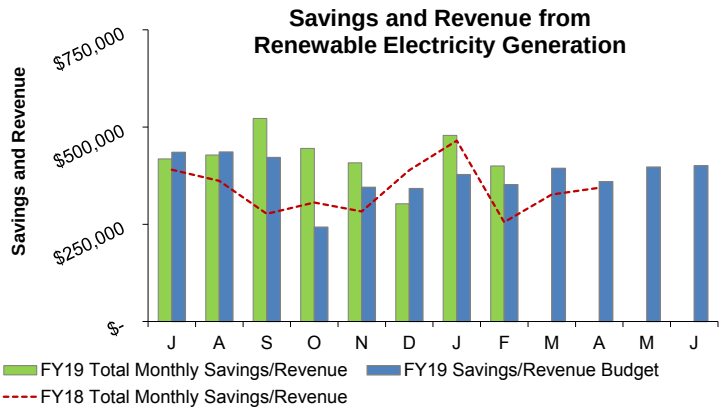


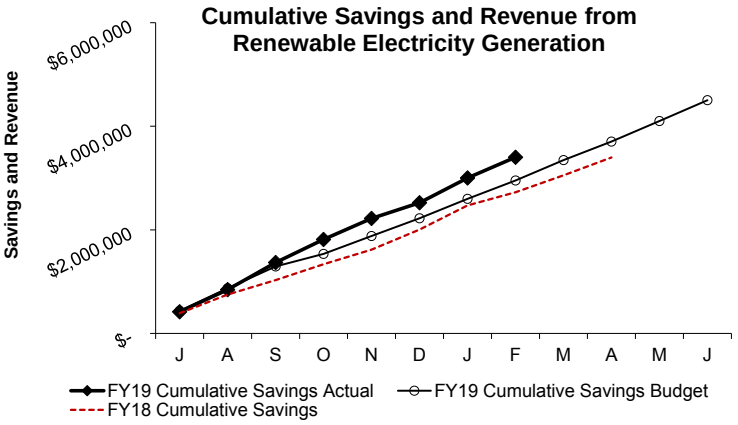
In the first 11 months of FY19, MWRA's electricity generation by renewable resources totaled 50,006 MWh. MWRA's total electricity usage was approximately 187,468 MWh. The MWRA total electricity usage is the sum of all electricity purchased for Deer Island and FOD plus electricity produced and used on-site 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 FY19, 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

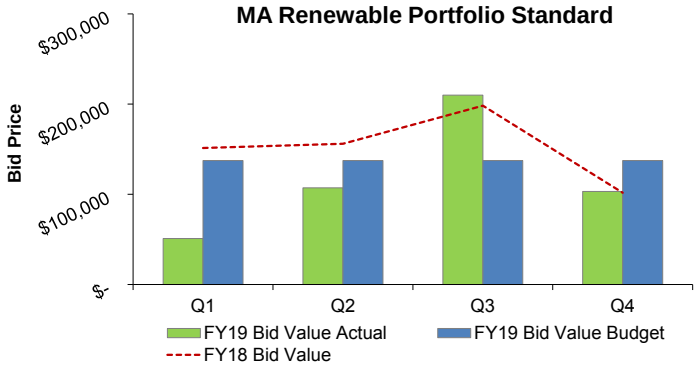
4th Quarter - FY19

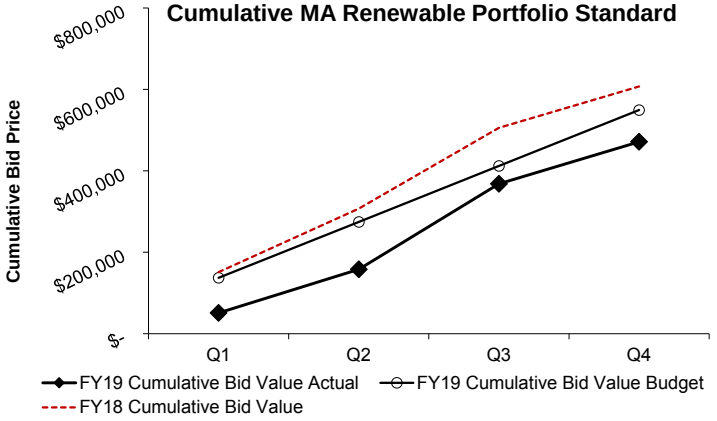




Savings and revenue from MWRA renewable electricity generation in the first 8 months of FY19 (actuals only through February[1]) is $3,402,326; which is 15% above budget[3].
Savings and revenue[2] from all renewable energy sources include wind turbines, hydroelectric generators, solar panels, and steam turbines (DI). This includes savings and revenue due to electricity generation (does not include avoided fuel costs and RPS RECs).

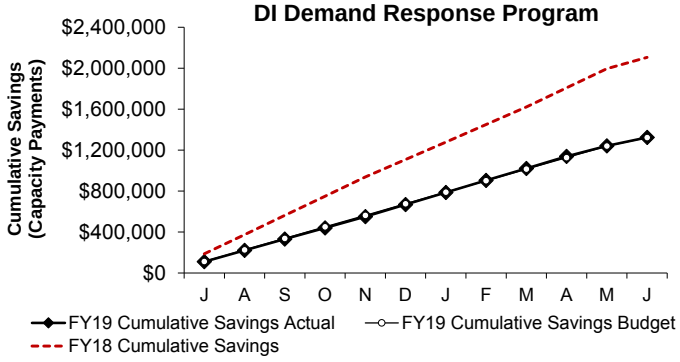
The use of DITP digester gas as a fuel source provides the benefit of both electricity generation from the steam turbine generators, and provides thermal value for heating the plant, equivalent to approximately 5 million gallons of fuel oil per year (not included in charts above).

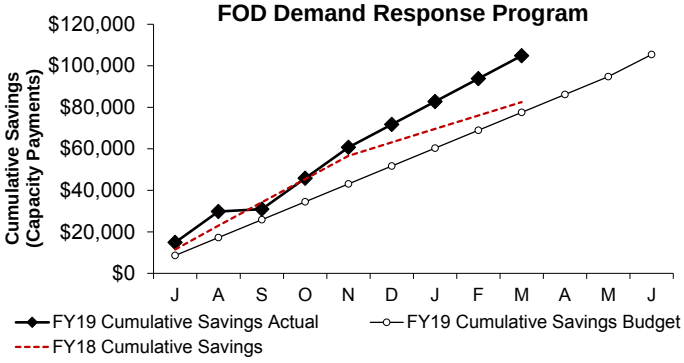




Bids were awarded during the 4th Quarter[1] from MWRA's Class 1, Class 2, and Solar REC renewable energy assets; 7,118 Q4 CY2018 Class I Renewable Energy Certificates (RECs), 1,400 Q4 CY2018 Class 2 RECs, and 40 Q4 CY2018 Solar RECs (SRECs) were sold for a total value of $103,175 RPS revenue; which is 25% below budget[3] for the Quarter. This is mostly due to Class 2 REC production being 48% under 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.



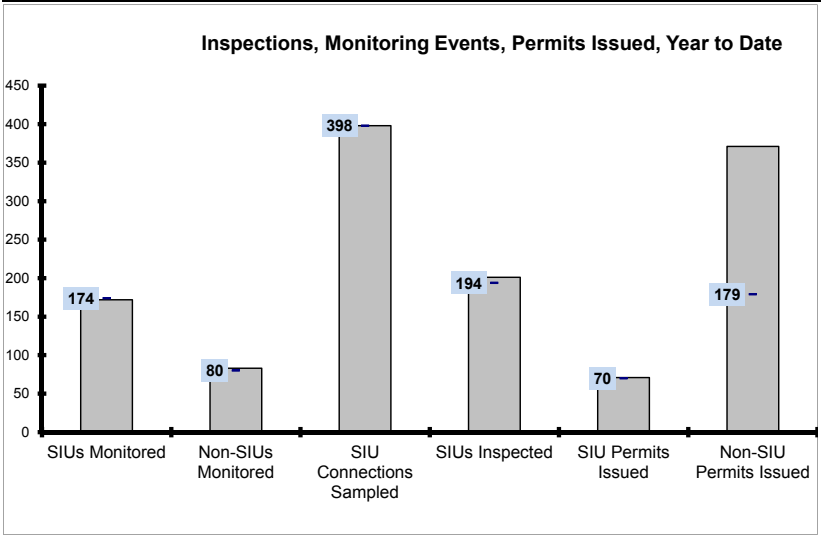


Currently Deer Island, JCWTP, and Loring Rd participate in the ISO-New England Demand Response Programs[4]. By agreeing to reduce demand and operate the facility generators to help reduce the ISO New England grid demand during periods of high energy demand, MWRA receives monthly Capacity Payments from ISO-NE. When MWRA operates the generators during an ISO-NE called event, MWRA also receives energy payments from ISO-NE.
FY19 Cumulative savings (Capacity Payments only) total $1,324,181 for Deer Island through June and $104,859 for FOD through March[1].

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 - FY19



EPA Required SIU Monitoring Events
for FY19: 174
YTD : **172**

Required Non-SIU Monitoring Events
for FY19: 80
YTD : **83**

SIU Connections to be Sampled
For FY19: 398
YTD: **398**

EPA Required SIU Inspections
for FY19: 194
YTD: **201**

SIU Permits due to Expire
In FY19: 70
YTD: **71**

Non-SIU Permits due to Expire
for FY19: 179
YTD: **371**

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; 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.

During the compilation of monitoring events for March, an error was identified. Samples collected by two sample associates were not showing in TRAC's reports; as a result, monitoring events for tthe first half of the fiscal year were under reported. This error was corrected in the third quarter. TRAC monitored all but two SIUs in FY19; those two SIUs did not discharge during the fiscal year, thus no sampling was required.

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.

TRAC also monitors one-third of the non-SIUs each year. SIU and Non-SIU permits are issued with durations of two to five years, depending on the category of industry, varying the number of permits that expire in a given year.

Number of Days to Issue a Permit

	0 to 120		121 to 180		181 or more		Permits Issued	
	SIU	Non-SIU	SIU	Non-SIU	SIU	Non-SIU	SIU	Non-SIU
Jul	1	11	0	1	1	3	2	15
Aug	2	122	1	1	0	2	3	125
Sep	2	14	0	2	1	5	3	21
Oct	3	16	0	7	0	14	3	37
Nov	2	10	0	2	0	7	2	19
Dec	5	4	0	4	0	2	5	10
Jan	3	12	0	3	0	3	3	18
Feb	9	18	0	2	0	4	9	24
Mar	9	24	0	2	0	6	9	32
Apr	7	17	0	4	0	3	7	24
May	11	20	0	3	0	3	11	26
Jun	13	19	0	1	1	0	14	20
% YTD	94%	77%	1%	9%	4%	14%	71	371

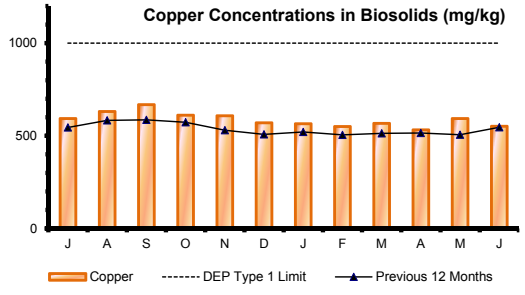
EPA requires MWRA to issue or renew 90% of SIU permits within 120 days of receipt of the application or the permit expiration date - whichever is later. EPA also requires the remaining 10% of SIU permits to be issued within 180 days.

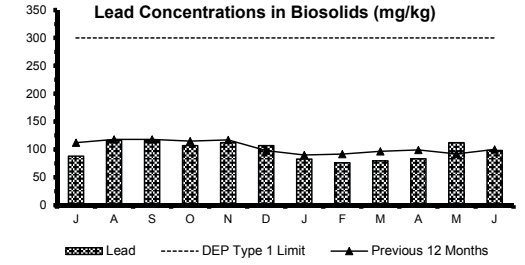
In the 4th quarter of FY19, 34 permits were issued, 14 of which were SIUs. All but one of the 14 SIU permits were issued within 120 days.

For the FY19 fiscal year, 67 of the 71 SIU permits issued were completed in the 120-day timeframe with one of the remaining four completed within the 180-day timeframe and three beyond the 180-day period.

The workflow issues resulting from staff turnover earlier in the fiscal year were addressed. Some permit issuances exceeding 180 days can be attributable to circumstances out of the control of TRAC, such as: waiting for data from an industry, waiting for approval from the municipality in which the industry was operating or intended to operate, or the late payment of a permit fee.

One SIU permit was issued in this quarter for the Clinton Sewer Service area; in the fiscal year, three SIU permits were issued, all within the timeframe stipulated by the Clinton NPDES permit (90 days).





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 - FY19

Western Water Operations and Maintenance

Grounds and Aqueducts Maintenance: Staff installed the new Aqueduct Trail Granite markers and began the seasonal mowing of the Aqueducts including the increased mowing of the designated public access trails.

Wachusett Dam: Staff supported engineering by providing access and input into the lower gatehouse piping replacement as well as Bastion Building structural repairs design projects. Staff made temporary repairs to the crest gate, raised the crest gate to the fully closed position, and initiated the evaluation process for making long-term repairs.

Flood Control: Staff monitored reservoir levels and river stream flow measurements and made necessary adjustments to keep the reservoirs within parameters and minimizing the impacts to downstream waterways during an exceptionally rainy spring.

.Metro Water Operations and Maintenance

Valve Program: Section 55 was filled, disinfected, and returned to service upon completion of work by an outside contractor. Valve operations were provided for in-house and CIP work. Staff supported the disinfection and activation of Bellevue Two Tank upon the completion of painting. Staff isolated and drained the Deer Island Tank to support the painting contractor. Deer Island's potable water system is being fed directly through PRVs. A 36-inch butterfly valve on Section 70 was repaired which allowed an isolation to repair a leak on the section, keeping Meter 205 in service. Staff deployed and set up a Mobile Pumping Unit at Lynnfield's pumping station as trial prior to upcoming support during the rehabilitation of their station. Refilling, flushing and activation of Meter 130 was completed. Northern Extra High service continues to remain normal with the Park Circle and Walnut Hill tanks in service during the repainting of Turkey Hill.

Water Pipeline Program: Work on the piping improvements at Meter 130 in Winchester to improvement flow capacity was completed by the end of the quarter. The work included connecting new piping to existing 14-inch piping downstream of the meter in the Winchester system, and the installation of three new valves. Work at the three coupling replacement locations and at the limit of work in Watertown on the Watertown Section pipeline was completed by the end of the quarter. New high-density polyethylene (HDPE) flanges were fused on to the ends of the existing pipe, and short flanged sections were installed to complete the repair.

Operations Engineering

Painting Turkey Hill and Bellevue No. 2 Standpipes: Turkey Hill tank remains isolated. The Contractor anticipates beginning disinfection at the end of July.

Painting Deer Island Water Storage Tank: Ops. Eng prepared the operation plan to isolation the tank. Prior to the Contractor taking over the tank, an isolation was conducted on June 19th. This was to ensure the PRV valves on Section 98 were working properly and there would be an uninterrupted water supply to Deer Island. The trial was successful and the tank was drained and turned over to the Contractor on June 24th.

Section 89/ 110 Emergency Action Planning (EAP)- Meeting held on 6/4 with impacted Northern Intermediate High communities to review the May 3rd water main break on Section 89 and the process and procedures that were conducted to isolate and repair the water main. This meeting was also to update the current EAP with the affected communities input. Section 110 when completed will be a redundant water main to Section 89, however, we still have a summer, high demand period to go through prior to its activation. Section 89 will then be isolated for a replacement/upgrade project. And while this happens, there will not be redundancy for Section 110. The EAP will be a contingency for either scenario.

Wastewater Operations & Maintenance

Remote Headworks Upgrades - Contract #7206: Channel #1 was turned over to the contractor for rehabilitation at the beginning of January 2018. Vendor training for channel #1 continued in April 2019. The 14-day acceptance test for Channel 1 was completed on 4/29/19.

Planned Utility Power Outage at Prison Point: Eversource had a planned utility power outage, for maintenance of their system, which affected the Prison Point CSO Facility on 4/11/19 to 4/13/19. Prison Point ran on facility generator power during this outage. A back-up portable generator was brought to the facility, in advance, as a precaution. Electrical and Operations staff were onsite for the duration of this outage. There were no operational impacts.

Wastewater OCC Improvements: Operations staff attended meetings and toured several operations control centers during the end of the quarter for the Wastewater OCC Improvements project.

Wastewater OCC: Operations staff successfully remotely operated the Wastewater OCC from the Carroll Treatment Plant on 5/2/19, as part of an emergency preparation drill.

Metro Equipment and Facility Maintenance

Hayes Pump Station: The station's permanent emergency generator experienced a catastrophic failure. Staff working with an outside vendor evaluated the generator and decided to rebuild the existing generator. MWRA staff working with a representative from the

repair company removed the generator from the engine. MWRA's one Megawatt portable generator served as station emergency power while the station generator was repaired. Once repaired the generator was reinstalled, tested and returned to service.

Metering

Community Assistance: On 15 occasions Metering staff reached out to member communities to identify anomalies in meter data which could indicate community issues such as leaks. This included identification of a flow reversal situation in Somerville. Monthly flows have been corrected to account for this issue and a new fire bypass valve has been ordered to permanently correct the issue.

A temporary shutdown of the Meter 206 site provided additional insight to the partial supply of the Lynn GE plant site indicating that the estimation of Meter #206 may have been in correct. Through coordination with the Lynn Water and Sewer Commission (LWSC) and GE, MWRA came to an agreement to temporarily use GE plant meter readings to provide monthly readings.

Verizon 4G Upgrade project: Metering staff continued to make progress on this project. Through this past quarter, meter crews had replaced approximately 80 of 257 water meter sites to 4G modems in preparation of Verizon's planned shutdown of their 3G data network. Meter Engineering is on schedule to meet the goal of January 1, 2020 for full system replacement.

TRAC

Inspections and Permitting: This fourth quarter TRAC issued a total of 54 MWRA 8(m) Permits allowing companies to work within an MWRA easement or property. Permits were issued in an average of 71 days.

Environmental Quality-Water

Algae: MWRA's algae monitoring season began in May and will continue through early Fall. Grab sampling and buoy data is exchanged routinely with DCR and reviewed to assess if additional monitoring is necessary. Staff also attended an EPA Cyanobacteria Monitoring Collaborative meeting in May.

ENQUAL-Water staff performed algal toxin and taste and odor compound sampling at Cosgrove Intake Reservoir; Wachusett and Quabbin raw water; and treated water taps throughout the quarter. Testing revealed no detections of algal toxins.

Community Support: MWRA's biennial drinking water sampling training occurred throughout the quarter. Both EnQual and Department of Lab Services' staff work with the Training Department to train sampling staff from MWRA's fully served and partially served communities. The sessions discuss chlorine residual testing, bacteriological sampling technique, and sample site investigations.

Environmental/Chemical Contract Management: Staff provided chemical delivery training throughout May to both wastewater and water treatment operators. Training focused on standard operating procedures, chemical acceptance testing, and safety.

Environmental Quality-Wastewater

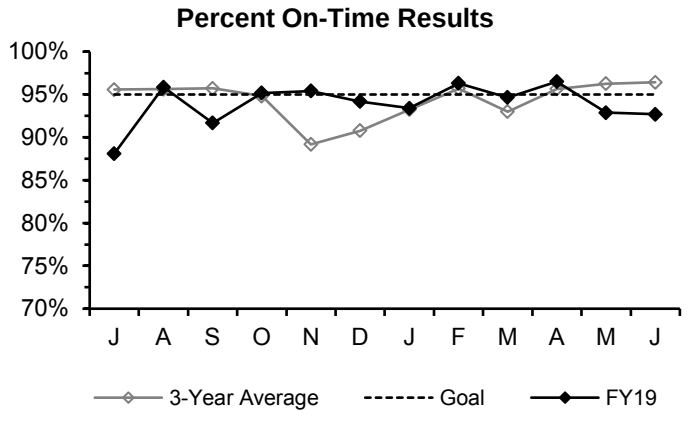
Ambient Monitoring: Between April and June MWRA's monitoring consultant conducted three regularly scheduled and five special red-tide surveys in Massachusetts Bay. The abundance of this organism triggered a Contingency Plan caution level threshold exceedance which was reported to regulators, the outfall monitoring science advisory panel, and the public on May 31. Levels of red tide increased weekly through June 19, and were at similar high levels on June 27. Red tide blooms in Massachusetts Bay commonly end between late June and early July.

Staff participated in an Outfall Monitoring Science Advisory Panel meeting in April, which included guidance from the Panel on information needed for their review of changes MWRA may propose to modify the Ambient Monitoring Plan.

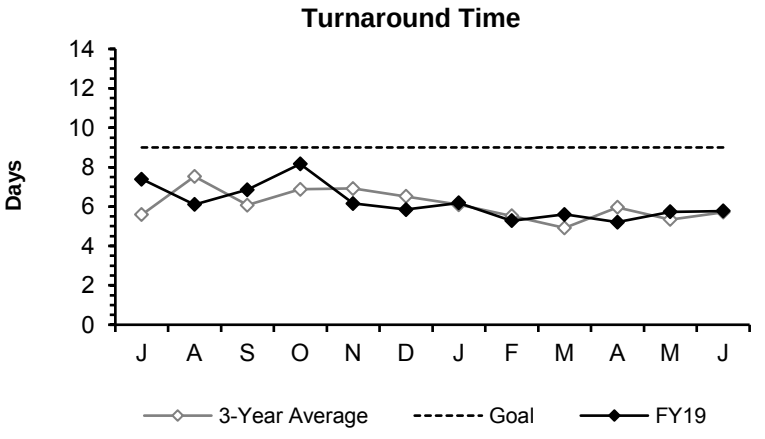
Harbor/CSO Monitoring: CSO receiving water monitoring sampling in support of the water quality standards variance and the CSO assessment continued, including post-storm sampling in the Charles and Alewife/Mystic. Posting of beach monitoring results on MWRA's web site began in late May and will continue through the swimming season.

Laboratory Services

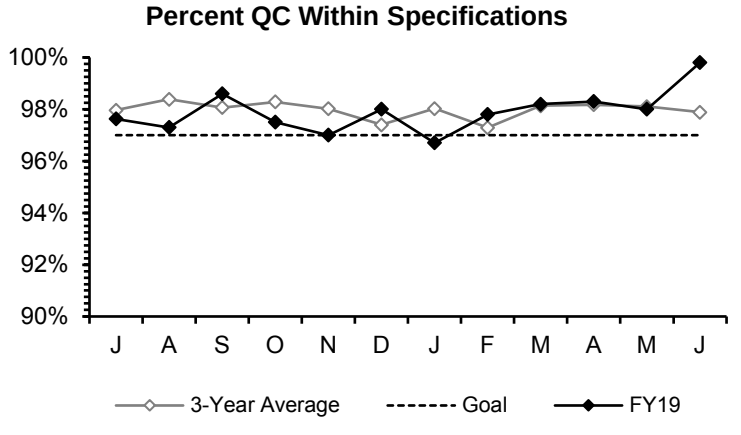
Fourth Quarter - FY19



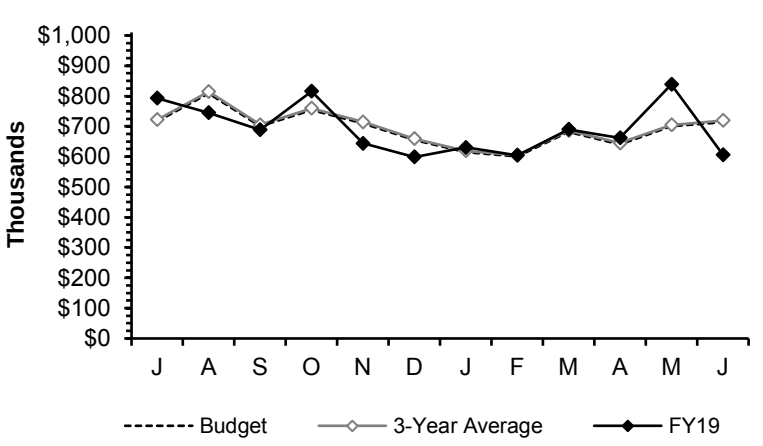
The Percent On-Time measurement was slightly below the 95% goal due to training of new staff.



Turnaround Time was faster than the 9-day goal.



Percent of QC tests meeting specifications exceeded the 97% in-house goal.



Value of Services Rendered exceeded annual budget projection.

Highlights:

School Lead: Several communities have started to do three year follow up from 2016 sampling of their schools. We received 1098 repeat samples from schools during the fourth quarter.

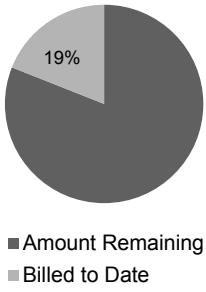
Mobile Lab: Participated in an ESU site visit to Nash Hill tank.

HOM: Received and processed three unanticipated *Alexandrium* (red tide) surveys during June.

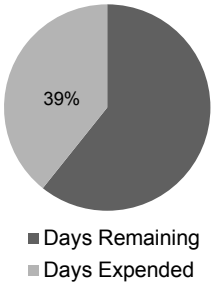
CONSTRUCTION PROGRAMS

Projects In Construction
4th Quarter – FY19

Money



Time



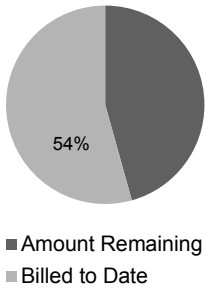
Southern Extra High Pipeline Section 111

Project Summary: This project consists of 6,800 linear feet of 36-inch water main in Dedham and Westwood and includes pipe jackings at the Dedham Corporate MBTA Station and at the MassDOT Route 95 East Street Rotary.

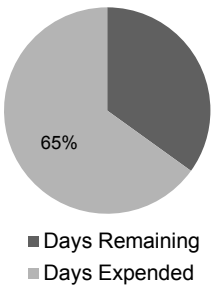
Notice to Proceed: 10-Aug-2018 *Contract Completion:* 7-Nov-2020

Status and Issues: As of June Crew 1 installed 468 ft. of 36" DICL pipe and Crew 2 installed 614 ft. of 36" DICL pipe for water mainline. Subcontractor GVC Construction installed 4 ft. of 36" DICL pipe for water mainline and installed the 36" gate valve vault, gate valve, and piping.

Money



Time



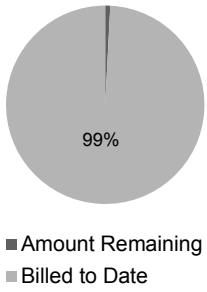
Chelsea Creek Headworks Upgrade

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.

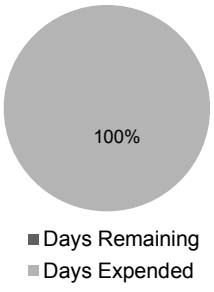
Notice to Proceed: 22-Nov-2016 *Contract Completion:* 21-Nov-2020

Status and Issues: As of June, the Contractor began cutting and chipping concrete for install of Ch. 2 stop log guides, for Screen 2 opening, to accommodate new inclined screw troughs. Demolished the existing Ch. 2 floor grating, influent and effluent thimbles, influent shaft submarine door on the Mezzanine Level. Performed operation test on Ch. 1 sluice gates with portable electric operator with no issue.

Money



Time



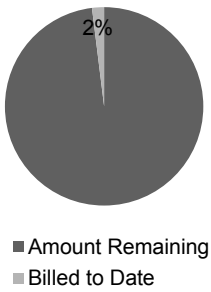
Wachusett Aqueduct Pumping Station

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: All work on this project is complete. Punchlist work is on-going.

Money



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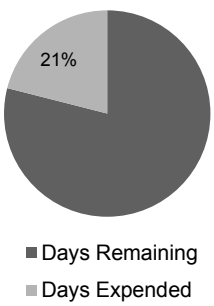


Commonwealth Ave Pump Station Improvements

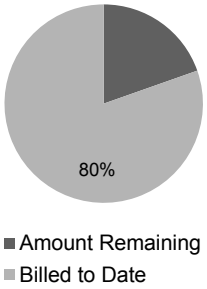
Project Summary: This project will provide a new connection to the station from two low service pipelines in Commonwealth A venue and add low service pumps so that the City of Newton can be supplied in the event of a City Tunnel failure.

Notice to Proceed: 28-Feb-2019 *Contract Completion:* 30-Sep-2020

Status and Issues: As of June, the Contractor began demolition of HVAC in the East Building and select HVAC demolition in the West Building. They continue to provide submittals and RFI's.

Projects In Construction
4th Quarter – FY19

Money



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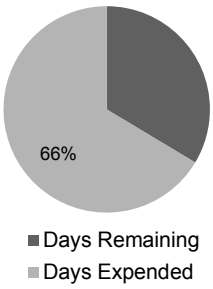


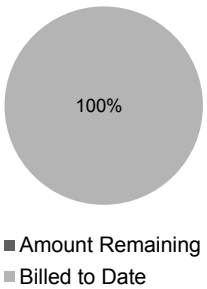
NIH Section 110 - Stoneham

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

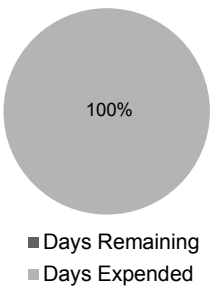
Notice to Proceed: 5-Sep-2017 *Contract Completion:* 1-Jun-2020

Status and Issues: As of June, the Contractor installed 1357-LF of 48" DIP water main along Pond Street, South Street, and Main Street. They removed 1215-CY of ledge along Pond Street and Main Street and completed the roadway restoration along Cottage Street.

Money



Time



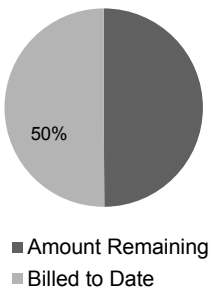
DITP Valves and Piping Replacements

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



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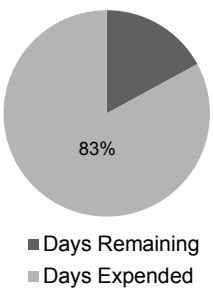


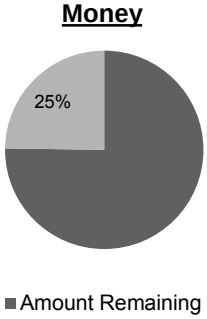
Winthrop Terminal VFD and Motor

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

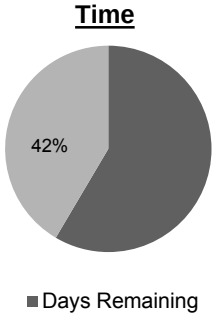
Notice to Proceed: 16-Jun-2016 *Contract Completion:* 12-Mar-2020

Status and Issues: VFD/Motor No. 2 commissioning testing completed and VFD No 5 installation started June 10th.

Money



Time



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: As of June, the two week Functional Testing of GT-1 began on June 3rd. Functional testing found scum trough installed at wrong elevation. Contractor corrected issue and GT-1 placed back in service on June 21st. GT-2 equipment was delivered and the Contractor started demolishing GT-2

CSO CONTROL PROGRAM

4th Quarter – FY19

All 35 projects in the Long-Term CSO Control Plan were complete as of December 2015 in compliance with Schedule Seven. Of the $910.1 million budget in the FY19 CIP for the CSO Control Program, approximately $6.5 million remain to be spent. On April 17, 2019, the MWRA Board of Directors authorized Amendment 1 to CSO Contract 7572 in the amount of $931,490 (described below), increasing the remaining amount to be spent on CSO control to approximately $7.4 million.

Project/Item	Status as of June 30, 2019
BWSC Dorchester Interceptor Inflow Removal	MWRA's CIP and the MOU/FAA with BWSC included $5.4 million for additional inflow removal from the BWSC Dorchester Interceptor system in the South Dorchester Bay Sewer Separation area, of which $1.7 million was transferred to the BWSC MOU/FAA CSO account and $1.6 million of that was withdrawn by BWSC to fund related design and construction work. On May 17, 2017, MWRA's Board of Directors authorized removing the remaining $3.8 million from the BWSC MOU/FAA (which ended on June 30, 2017) and including this funding amount in a separate, 4-year financial assistance agreement with BWSC effective July 1, 2017. The new agreement limits MWRA financial assistance to reimbursement of the eligible costs of BWSC construction work reviewed and approved by MWRA, up to $3.8 million. BWSC recently completed sewer system evaluations and is preparing a construction contract for inflow removal that it plans to submit to MWRA for eligibility approval this fall.
City of Cambridge Memorandum of Understanding and Financial Assistance Agreement	The City of Cambridge attained substantial completion of its last project, CAM004 Sewer Separation, in December 2015 in compliance with Schedule Seven, and attained substantial completion of related surface restoration work by the end of 2017. MWRA made a final transfer of funds to the Cambridge CSO account in December 2017, in the amount of $1,254,551, to cover eligible costs through June 30, 2018, when the 22 year-old, $100.2 million MOU/FAA ended. Cambridge continues to support ongoing MWRA review of the construction contracts Cambridge managed under the CSO MOU and Financial Assistance Agreement. Staff expect to complete the review and issue a final eligibility certification by September 30, 2019.
MWRA CSO Performance Assessment – Contract 7572	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. MWRA issued progress reports on the performance assessment on November 30, 2018 and May 3, 2019, and plans to issue a third progress report in October 2019. The issued progress reports presented the analyses of rainfall and CSO meter data collected in the periods April 15 - June 30, 2018 and July 1 – December 31, 2018, respectively. The third progress report will cover the data collection period of January 1 – June 30, 2019. Upgrade and improved calibration of MWRA's hydraulic model is underway and will be complete by August 31, 2019, allowing a comparison of model predicted and field measured CSO discharges, which will be presented in the October 2019 semiannual progress report. Model recalibration and verification will bring the meter results and model predictions closer together to gain assurance of the accuracy of the model in predicting CSO discharges and verifying attainment of the Long Term Control Plan's typical year levels of CSO control. AECOM also continues to conduct investigations at several outfalls where metered CSO discharges differ from historical model predictions. On April 17, 2019, the MWRA Board of Directors approved Amendment 1 to Contract 7572 in the amount of $931,470. The amendment adds receiving water quality modeling of the Lower Charles River/Charles Basin and the Alewife Brook/Upper Mystic River in lieu of water quality data statistical analyses; extends temporary CSO metering to June 2020 at 36 CSO regulators; and provides for the eventual transfer of the temporary meters at regulators tributary to MWRA CSO outfalls for MWRA's long-term use in complying with expected CSO public notification requirements. MWRA continue to collect water quality data in CSO affected waters, with emphasis in the Charles River and Alewife Brook/Upper Mystic River, in part to support AECOM's receiving water modeling.

CIP Expenditures
4th Quarter – FY19

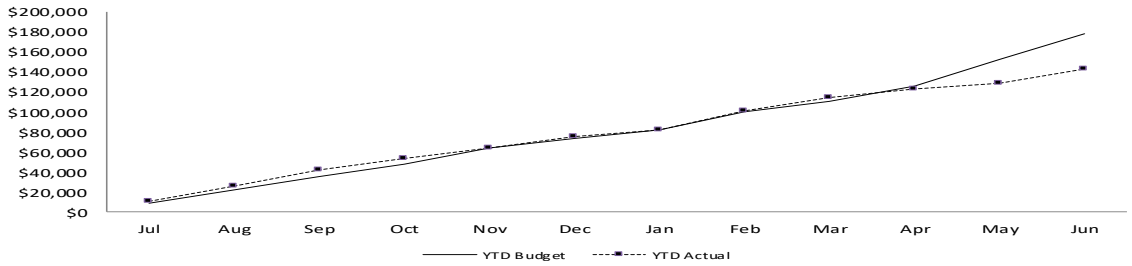
FY19 Capital Improvement Program Expenditure Variances through June by Program ($ in thousands)				
Program	FY19 Budget Through June	FY19 Actual Through June	Variance Amount	Variance Percent
Wastewater	93,803	74,850	(18,953)	-20%
Waterworks	77,085	65,647	(11,438)	-15%
Business and Operations Support	7,968	2,408	(5,560)	-70%
Total	$178,856	$142,905	($35,951)	-20%

Project underspending within Wastewater was due to delays in Channel 1 work, odor control equipment delivery, and redesign of the lower roofs for the Chelsea Creek Headworks Upgrade Construction, delay in completion of design documents for Nut Island Odor Control & HVAC Construction, updated schedules for Deer Island Clarifier Rehab Phase 2 and Dorchester Interceptor Sewer Construction contracts, schedule change and re-scoping of project for DI HVAC Equipment Replacement, delay in city of Somerville design and construction awards for the Somerville Marginal In-System Storage, delay in the notice to proceed for the Residuals Electrical and Mechanical contracts due to a combined scope of services, and timing of initial work for the Clinton Roofing Rehabilitation. This was partially offset by greater than anticipated community requests for grants and loans, and contractor progress on Deer Island Gravity Thickener Rehabilitation. Project underspending in Waterworks was due to delay in notice-to-proceed and issue with MBTA crossing for Southern Extra High Section 111 Construction 3, contract awarded less than budget and schedule change for Painting DI Water Tank, awarded less than budget and behind schedule due to additional structural repairs and antenna relocation for Bellevue 2 and Turkey Hill Painting/Improvements contract, schedule delay for the Maintenance Building/Garage Washbay/Storage Building contract, termination of Peabody Pipeline Design/ESDC and cancelled Construction, and delay in award for Chestnut Hill Emergency Pumping Station Design/CA. This was partially offset by greater than anticipated requests for community loans, progress for the Southern Extra High Section 111 Construction 2, Section 56 Pipe Demolition, Northern Intermediate High Section 89 & 29 Construction Phase 2, and timing of Watershed Land purchases.

Budget vs. Actual CIP Expenditures

($ in thousands)

Total FY19 CIP Budget of $178,856



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 6/30/2019	$188.8 million
Unused capacity under the debt cap:	$1.38 billion
Estimated date for exhausting construction fund without new borrowing:	MAY-20
Estimated date for debt cap increase to support new borrowing:	Not anticipated at this time
Commercial paper/Revolving loan outstanding: Commercial paper capacity / Revolving Loan	$128 million $350 million
Budgeted FY19 Cash Flow Expectancy*:	$188 million

* Cash based spending is discounted for construction retainage.

DRINKING WATER QUALITY AND SUPPLY

Source Water – Microbial Results and UV Absorbance

4th Quarter – FY19

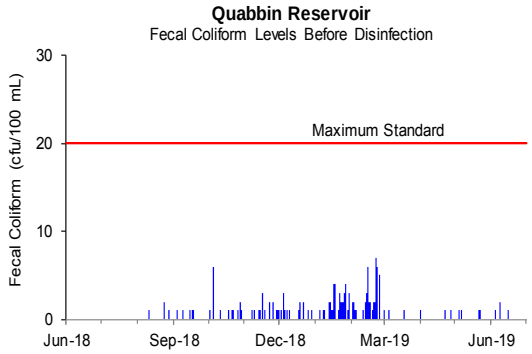
Source Water – Microbial Results

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.**

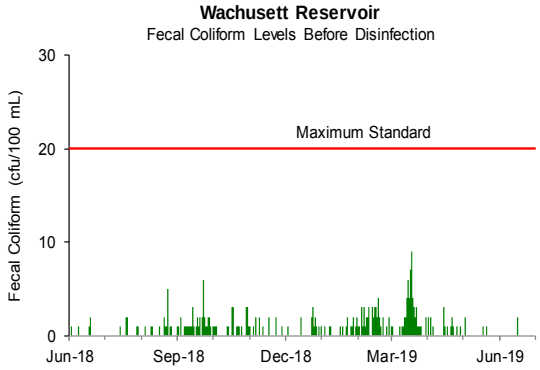


Sample Site: Wachusett Reservoir

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.**

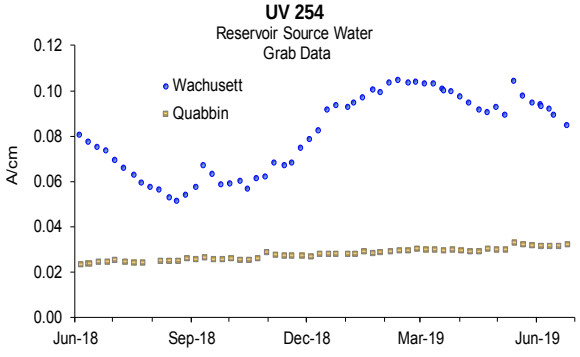


Source Water – UV Absorbance

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 0.032 A/cm.

Wachusett Reservoir UV-254 levels are currently around 0.082 A/cm.



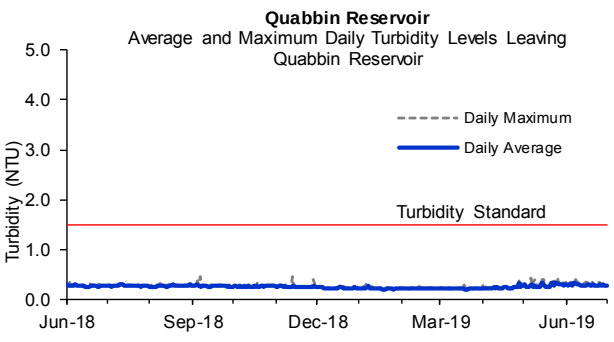
Source Water – Turbidity

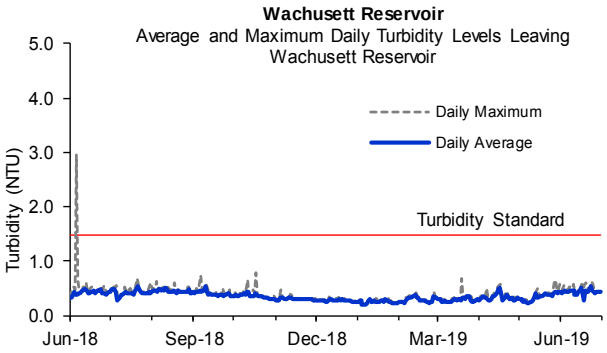
4th Quarter – FY19

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

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

Turbidity of Quabbin Reservoir water is monitored continuously at the Brutsch Water Treatment Facility (BWTF) before UV and chlorine disinfection. Turbidity of Wachusett Reservoir is monitored continuously at the Carroll Water Treatment Plant (CWTP) before ozonation and UV disinfection. Maximum turbidity results at Quabbin and Wachusett were within DEP standards for the quarter.



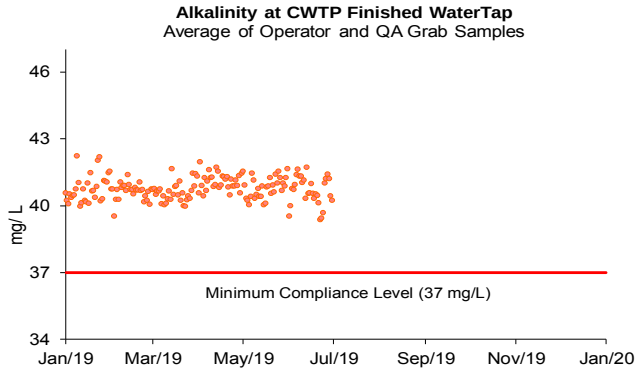


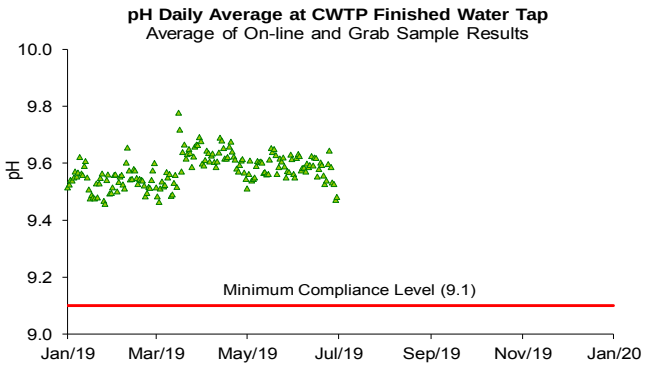
Treated Water – pH and Alkalinity Compliance

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

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

Distribution system samples were collected on June 12 and 13, 2019. Distribution system sample pH ranged from 9.3 to 9.6 and alkalinity ranged from 40 to 42 mg/L. No sample results were below DEP limits for this quarter.





Treated Water – Disinfection Effectiveness

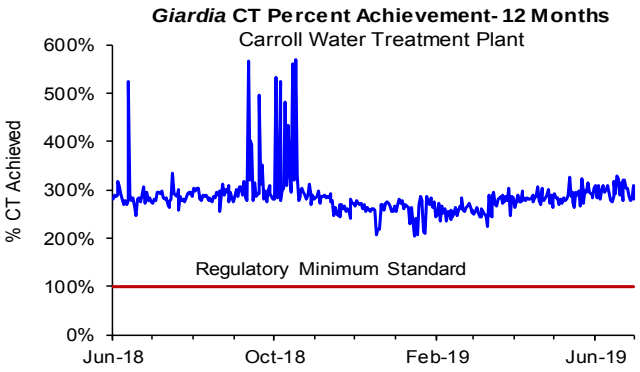
4th Quarter – FY19

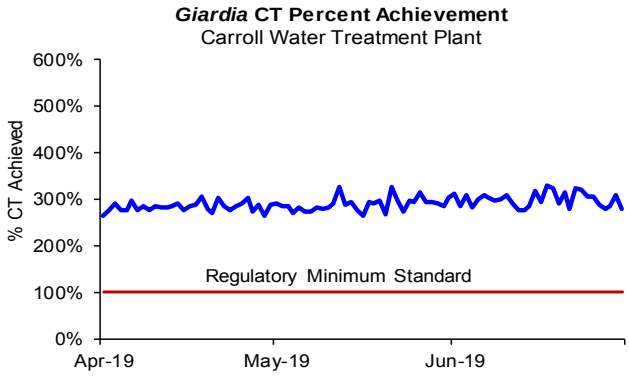
At the Carroll Water Treatment Plant (CWTP), MWRA meets the required 99.9% (3-log) inactivation of *Giardia* using ozone (reported as CT: concentration of disinfectant x contact time) and the required 99% (2-log) inactivation of *Cryptosporidium* using UV (reported as IT: intensity of UV x time). MWRA 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:

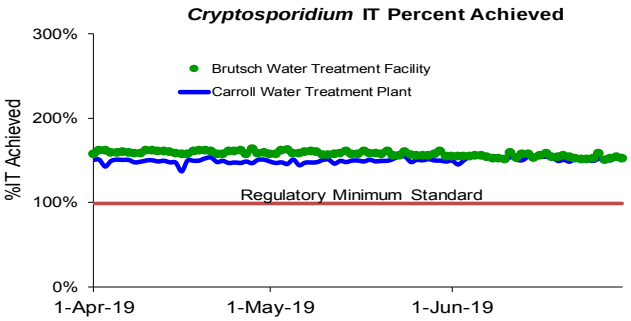
- Ozone dose at the CWTP varied between 2.8 to 3.7 mg/L for the quarter.
- *Giardia* CT was maintained above 100% at all times the plant was providing water into the distribution system this quarter, as well as every day for the last fiscal year.
- *Cryptosporidium* IT was maintained above 100% during the month. Off-spec water was less than 5%.
- The Wachusett Aqueduct Pump Station (WAPS) will improve redundancy in the MWRA water system. WAPS testing was initiated in June 2018 and continued through October 2018. Prior to and during WAPS testing, CWTP proactively increased the ozone dose and "CT achievement". This is visible in the top left graph.

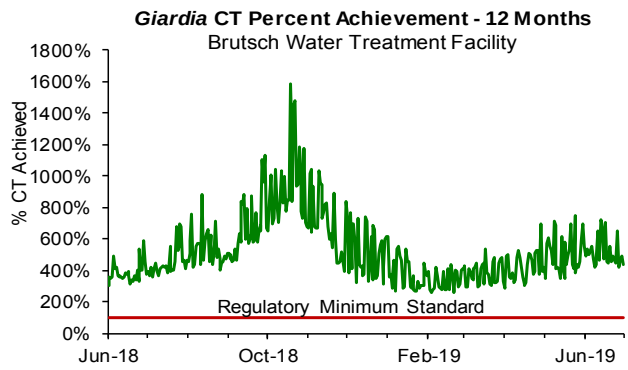


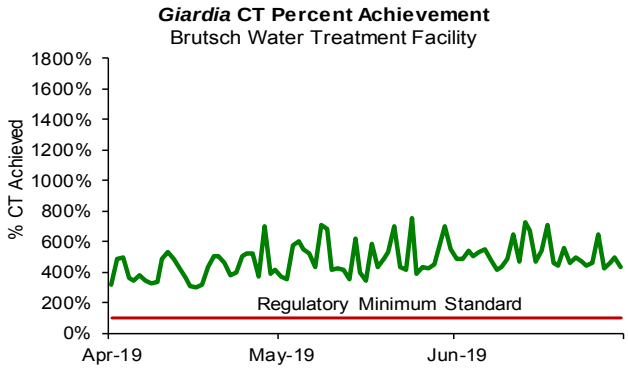


Quabbin Reservoir (CVA Supply) at: Brutsch Water Treatment Facility

- 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 1.5 to 1.9 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%.







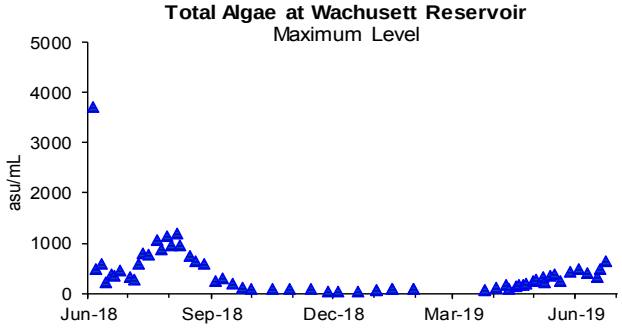
Source Water - Algae

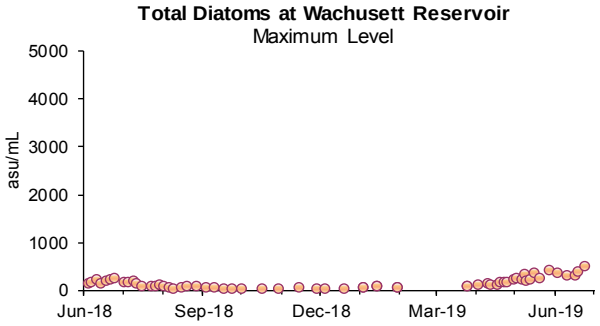
4th Quarter – FY19

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.





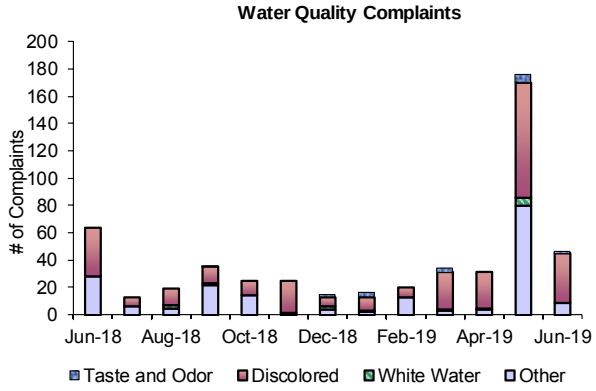
Drinking Water Quality Customer Complaints: Taste, Odor, or Appearance

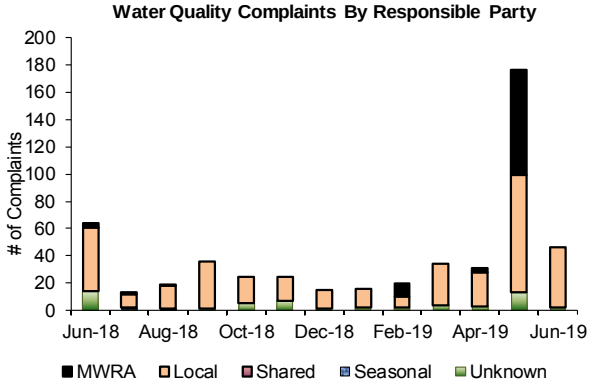
MWRA collects information on water quality complaints that typically fall into four categories: 1.) discoloration due to MWRA or local pipeline work; 2.) taste and odor due to algae blooms in reservoirs or chlorine in the water; 3.) white water caused by changes in pressure or temperature that traps 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 253 complaints during the quarter compared to 187 complaints from 4th Quarter of FY18. Of these complaints, 146 were for "discolored water", 7 were for "taste and odor", 7 were for "white water", and 93 were for "other". Of these complaints, 155 were local community issues, 80 were MWRA related issues, and 18 were unknown in origin.

- On May16, Arlington reported seventy low pressure and no water complaints when MWRA staff were performing valve maintenance on a meter located at Palmer Street.
- On May 22, Marblehead reported twenty eight discolored water complaints when the local fire department was performing hydrant flushing in the area of Pilgrim Street.





Bacteria & Chlorine Residual Results for Communities in MWRA Testing Program

4th Quarter – FY19

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, 5 of the 6,227 community samples (0.08% system-wide) submitted to MWRA labs for analysis tested positive for total coliform (Chelsea, Waltham - May; Bedford, Peabody, Woburn - June). One of the 1,961 Shared community/MWRA samples (0.05%) tested positive for total coliform. No samples tested positive *for E.coli* and repeat samples were absent of both total coliform and *E.coli*. Only 0.1% of the Fully Served community samples had chlorine residuals lower than 0.2 mg/L for the quarter. No community violated the TCR. Starting in May, Marlborough is considered fully-supplied by MWRA and MADEP.

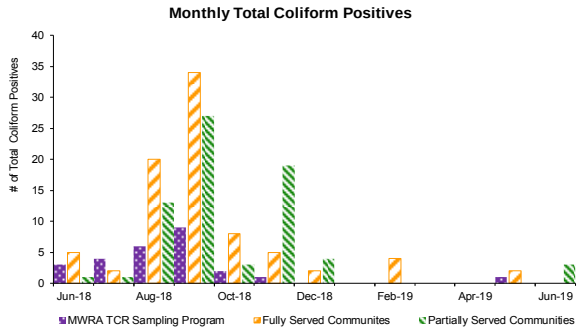
NOTES:

a) 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.

b) The number of samples collected depends on the population served and the number of repeat samples required.

c) These communities are partially supplied, and may mix their chlorinated supply with MWRA chloraminated supply.

d) Part of the Chicopee Valley Aqueduct System. Free chlorine system.



		Total Coliform # Samples (b)	Total Coliform # (%) Positive	E.coli # Positive	Assessment Required
MWRA	MWRA Locations	388	0 (0%)	0	
MWRA a	Shared Community/MWRA sites	1573	1 (0.06%)	0	
MWRA	*Total: MWRA*	1961	1 (0.05%)	0	No
Fully Served	ARLINGTON	169	0 (0%)	0	
Fully Served	BELMONT	104	0 (0%)	0	
Fully Served	BOSTON	780	0 (0%)	0	
Fully Served	BROOKLINE	224	0 (0%)	0	
Fully Served	CHELSEA	172	1 (0.58%)	0	No
Fully Served	DEER ISLAND	51	0 (0%)	0	
Fully Served	EVERETT	169	0 (0%)	0	
Fully Served	FRAMINGHAM	237	0 (0%)	0	
Fully Served	LEXINGTON	117	0 (0%)	0	
Fully Served	LYNNFIELD	18	0 (0%)	0	
Fully Served	MALDEN	234	0 (0%)	0	
Fully Served	MARBLEHEAD	72	0 (0%)	0	
Fully Served	MARLBOROUGH	84	0 (0%)	0	
Fully Served	MEDFORD	204	0 (0%)	0	
Fully Served	MELROSE	117	0 (0%)	0	
Fully Served	MILTON	101	0 (0%)	0	
Fully Served	NAHANT	30	0 (0%)	0	
Fully Served	NEWTON	276	0 (0%)	0	
Fully Served	NORTHBOROUGH	48	0 (0%)	0	
Fully Served	NORWOOD	99	0 (0%)	0	
Fully Served	QUINCY	338	0 (0%)	0	
Fully Served	READING	130	0 (0%)	0	
Fully Served	REVERE	180	0 (0%)	0	
Fully Served	SAUGUS	104	0 (0%)	0	
Fully Served	SOMERVILLE	273	0 (0%)	0	
Fully Served	SOUTHBOROUGH	30	0 (0%)	0	
Fully Served	STONEHAM	91	0 (0%)	0	
Fully Served	SWAMPSCOTT	54	0 (0%)	0	
Fully Served	WALTHAM	219	1 (0.46%)	0	No
Fully Served	WATERTOWN	130	0 (0%)	0	
Fully Served	WESTON	45	0 (0%)	0	
Fully Served	WINTHROP	72	0 (0%)	0	
Fully Served	*Total: Fully Served*	*4972*	*2 (0.04%)*		
Partially Served	BEDFORD	60	1 (1.67%)	0	No
Partially Served	CANTON	89	0 (0%)	0	
Partially Served	HANSCOM AFB	31	0 (0%)	0	
Partially Served	MARLBOROUGH	42	0 (0%)	0	
Partially Served	NEEDHAM	123	0 (0%)	0	
Partially Served c	PEABODY	212	1 (1.47%)	0	No
Partially Served	WAKEFIELD	148	0 (0%)	0	
Partially Served	WELLESLEY	114	0 (0%)	0	
Partially Served	WILMINGTON	87	0 (0%)	0	
Partially Served	WINCHESTER	91	0 (0%)	0	
Partially Served	WOBURN	198	1 (0.51%)	0	No
CVA d	SOUTH HADLEY FD1	60	0 (0%)	0	
	Total: CVA & Partially Served	*1255*	*3 (0.24%)*		
	Total: Community Samples	*6227*	*5 (0.08%)*		

Chlorine Residuals in Fully Served Communities

	2018							2019					
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
% <0.1	0.0	0.3	0.7	0.5	0.7	0.7	0.2	0.3	0.2	0.1	0.0	0.0	0.0
% <0.2	0.4	0.5	1.0	1.5	1.9	1.6	1.0	0.3	0.2	0.1	0.1	0.1	0.1
% <0.5	0.7	1.5	3.4	4.6	5.8	3.8	2.3	1.1	0.6	0.4	0.3	0.3	0.9
% <1.0	1.6	3.2	8.9	11.9	11.2	8.3	5.2	2.8	1.8	1.7	1.4	1.9	3.2
% ≥1.0	98.4	96.8	91.1	88.2	88.8	91.7	94.8	97.2	98.2	98.4	98.7	98.1	96.8

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

4th Quarter – FY19

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.

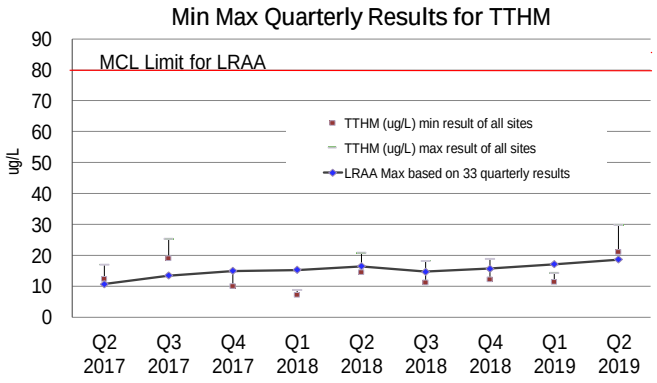
Partially served and CVA communities are responsible for their own compliance monitoring and reporting, and must be contacted directly for their individual results. The chart below combines all three CVA communities data (Chicopee, Wilbraham and South Hadley FD1).

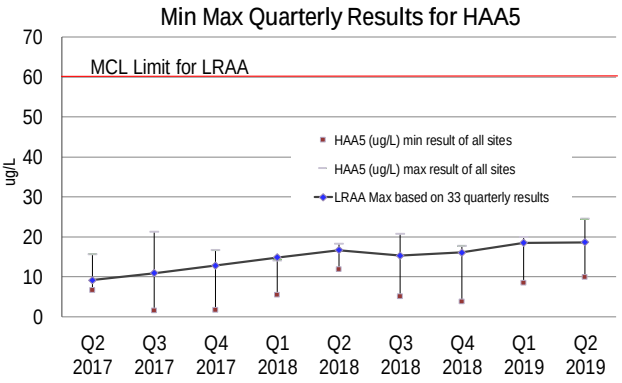
Bromate is tested monthly per DEP requirements for water systems that treat with ozone. Bromide in the raw water may be converted into bromate following ozonation. EPA's RAA MCL standard for bromate is 10 ug/L.

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 = 18.6 ug/L; HAA5s = 18.6 ug/L. The current RAA for Bromate = 0.0 ug/L. CVA's DBP levels continue to be below current standards.

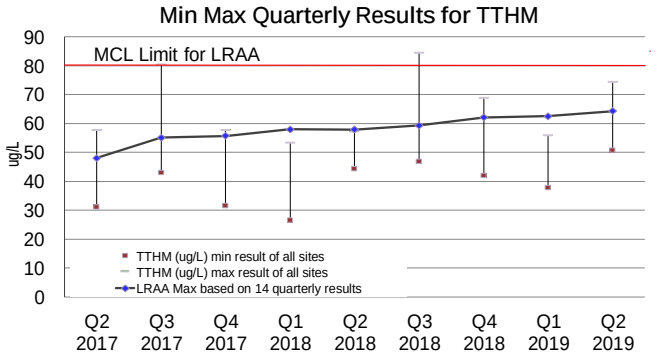
A quarterly DBP location in Marlborough was added to MWRA's Compliance Program in Q2, 2019.

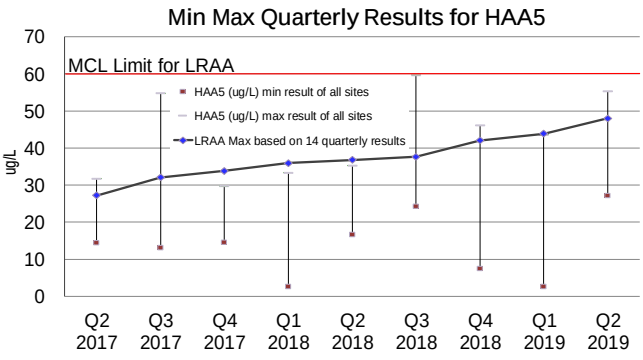
MetroBoston Disinfection By-Products





CVA Disinfection By-Products (Combined Results)





Water Supply and Source Water Management

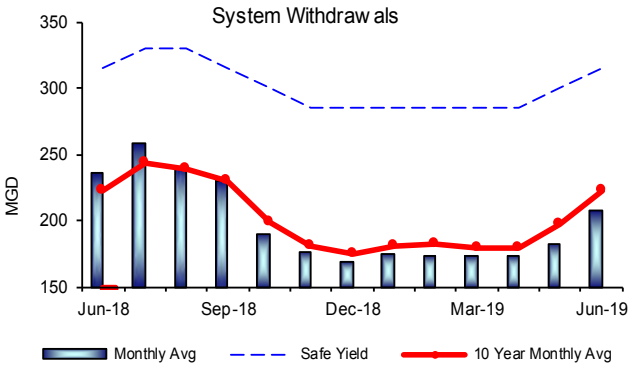
4th Quarter – FY19

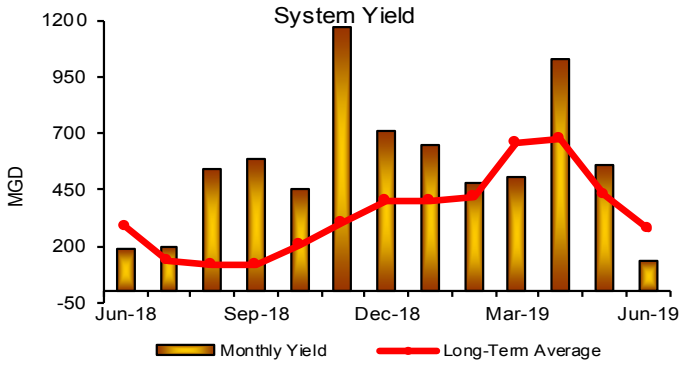
Background

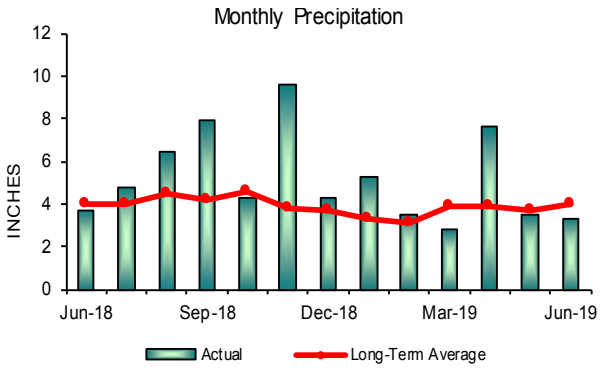
A reliable supply of water in MWRA's reservoirs depends on adequate precipitation during the year and seasonal hydrologic inputs from watersheds that surround the reservoirs. Demand for water typically increases with higher summer temperatures and then decreases as temperatures decline. Quabbin Reservoir 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.

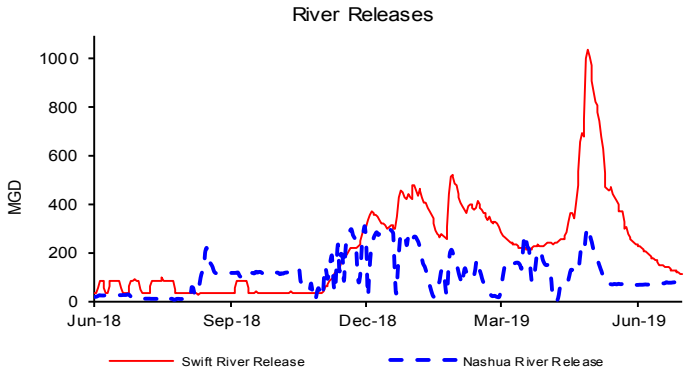
Outcome

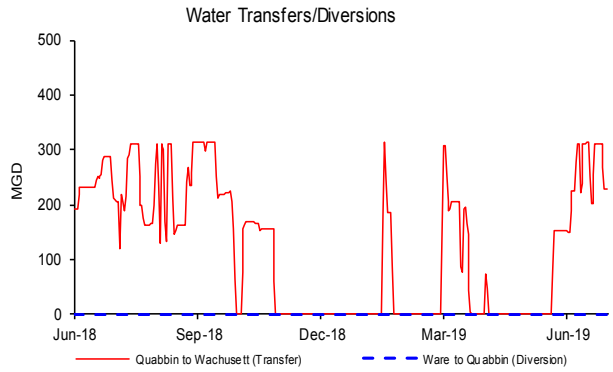
The volume of the Quabbin Reservoir was in normal operating level at 97.6% as of June 30, 2019; a 2.0% decrease for the quarter, which represents a reduction of more than 8.2 billion gallons of storage and a decrease in elevation of 1.06' for the quarter. System withdrawal for the quarter was below the 10 year monthly average. Precipitation and Yield for the quarter were above their respective long term quarterly average.

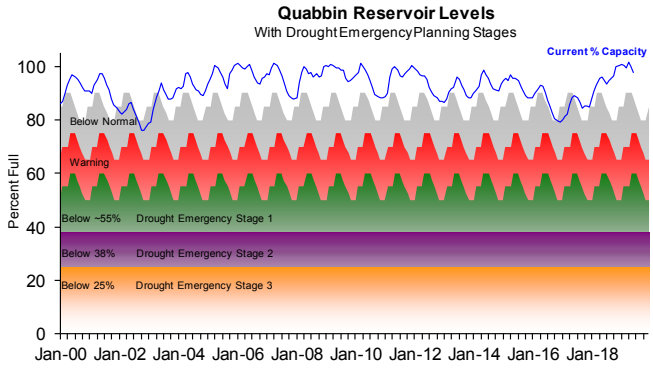












WASTEWATER QUALITY

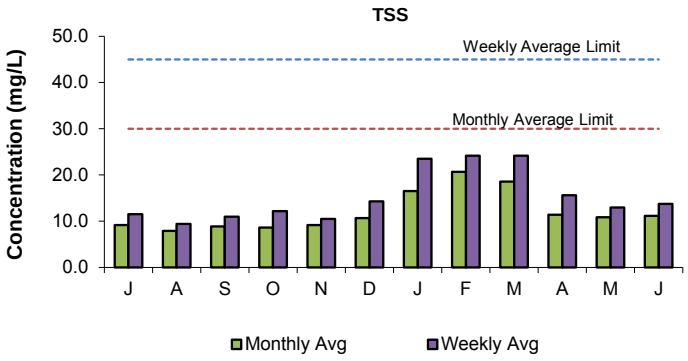
NPDES Permit Compliance: Deer Island Treatment Plant

4th Quarter - FY19

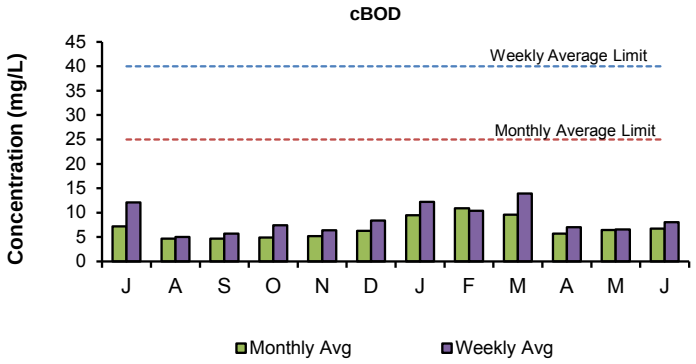
NPDES Permit Limits

Effluent Characteristics		*Units*	*Limits*	*April*	*May*	*June*	*4th Quarter Violations*	*FY19 YTD Violations*
Dry Day Flow (365 Day Average):		mgd	436	309.0	312.3	316.4	0	0
cBOD:	Monthly Average	mg/L	25	5.7	6.4	6.7	0	0
	Weekly Average	mg/L	40	7.0	6.5	8.1	0	0
TSS:	Monthly Average	mg/L	30	11.4	10.9	11.2	0	0
	Weekly Average	mg/L	45	15.6	13.0	13.8	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	0	0	0
	Weekly Geometric Mean	col/100mL	14000	19	18	57	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	6.4-.6.9	6.5-6.9	6.4-6.9	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	25	0	0

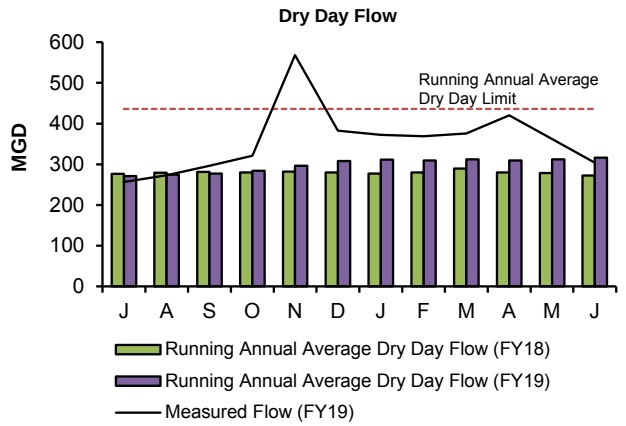
There have been no permit violations in FY19 to date at the Deer Island Treatment Plant (DITP).



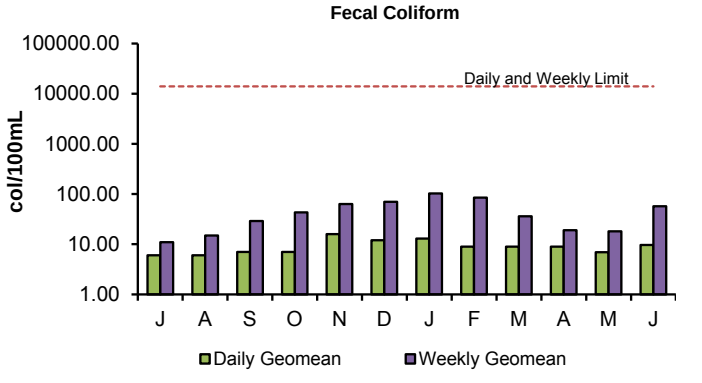
Total Suspended Solids (TSS) in the effluent is a measure of the amount of solids that remain suspended after treatment. All TSS measurements for the 4th Quarter were within permit limits.



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 - FY19

NPDES Permit Limits

Effluent Characteristics		*Units*	*Limits*	*April*	*May*	*June*	*4th Quarter Violations*	*FY19 YTD Violations*
Flow:	12-month Rolling Average:	mgd	3.01	3.17	3.21	3.23	3	8
BOD:	Monthly Average:	mg/L	20	1.3	0.9	7.1	0	0
	Weekly Average:	mg/L	20	2.2	1.6	23.5	1	1
TSS:	Monthly Average:	mg/L	20	4.2	3.6	3.9	0	0
	Weekly Average:	mg/L	20	5.4	3.7	5.4	0	1*
pH:		SU	6.5-8.3	6.9-7.5	6.7-7.4	7.1-7.5	0	0
Dissolved Oxygen:	Daily Average Minimum:	mg/L	6	8.7	8.4	8.2	0	0
E. Coli:	Monthly Geometric Mean:	cfu/100mL	126	6.0	5.0	6.0	0	0
	Daily Geometric Mean:	cfu/100mL	409	14.0	14.0	31.0	0	1
TCR:	Monthly Average:	ug/L	17.6	4.7	0.1	0.0	0	0
	Daily Maximum:	ug/L	30.4	57.1	2.5	0.0	2	2
Copper:	Monthly Average:	ug/L	11.6	5.8	3.5	4.8	0	0
	Daily Maximum:	ug/L	14.0	5.8	3.5	5.0	0	0
Total Ammonia Nitrogen: June 1st - October 31st	Monthly Average:	mg/L	2.0	0.11	0.10	0.04	0	0
	Daily Maximum:	mg/L	3.0	0.15	0.14	0.14	0	0
Total Phosphorus: April 1st - October 31st	Monthly Average:	mg/L	0.15	0.05	0.05	0.06	0	0
	Daily Maximum:	mg/L	RPT	0.08	0.08	0.09	0	0
Acute Toxicity+:	Daily Minimum:	%	≥100	N/A	N/A	>100	0	0
Chronic Toxicity+:	Daily Minimum:	%	≥62.5	N/A	N/A	25	1	1

There were fourteen permit violations in FY19 at the Clinton Treatment Plant.

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

2nd Quarter: There were three permit violations in the second quarter.

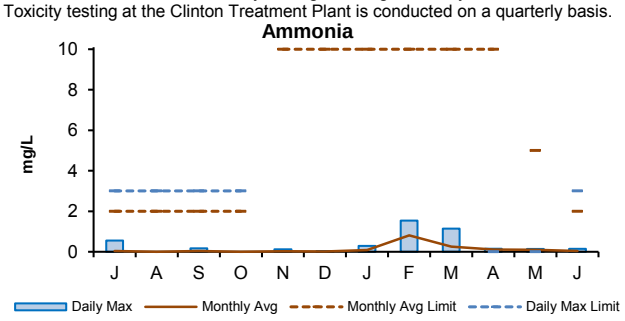
3rd Quarter: There were four permit violations in the third quarter.

4th Quarter: There were seven permit violations in the fourth quarter.

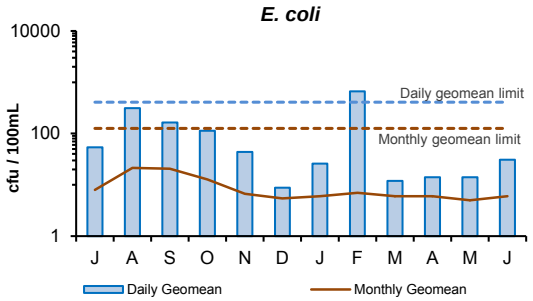
- The 12-month rolling average flow exceeded the limit of 3.01 MGD due to excessive rains in the region in late 2018.
- The BOD weekly average exceeded the limit of 20 mg/L the week of June 9th, 2019, as a result of a high-BOD slug of industrial wastewater. This event was reported as a plant upset and the identified industrial source is not expected to cause upsets in the future.
- There were two exceedances of the maximum daily total chlorine residual limit on April 28-29 during high flows. Most samples taken on these dates did not detect residual chlorine, but the daily maximum was exceeded. While the sodium bisulfite pump was operating at maximum speed, it was dosing at a rate that should have been neutralizing more chlorine than was being added.
- The chronic toxicity in June was measured at 25%, below the permit limit of 62.5%.

* This violation is of the TSS weekly average loading in lbs/day, not TSS concentration in mg/L.

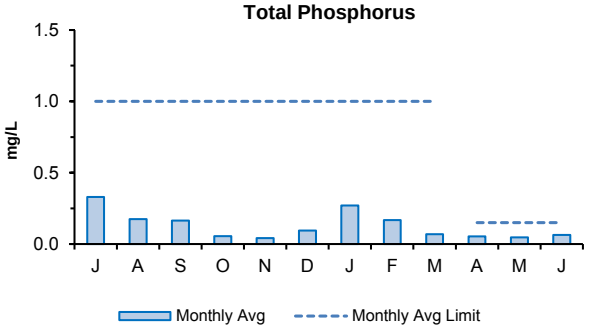
\+ Toxicity testing at the Clinton Treatment Plant is conducted on a quarterly basis.



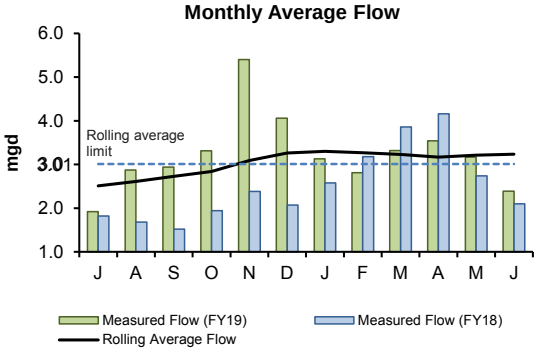
The 4th Quarter's monthly average and daily maximum concentrations of ammonia were below the permit limits. The monthly average and daily maximum limits for the 4th Quarter are variable, ranging from 10 and 35.2 mg/L to 2 and 3 mg/L respectively. The permit limits are most stringent from June to October when warm weather conditions are most conducive to potential eutrophication.



E. coli is an indicator for the possible presence of pathogens. The *E. coli* daily geomean on February 15th was 667 cfu/100mL, exceeding the permit limit of 409 cfu/100mL. A return activated sludge valve failure on February 13th in Final Clarifier 2 ultimately led to this exceedance. *E. coli* levels were very low during February outside of this incident, reflected by the monthly geometric mean of 7 cfu/100mL



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

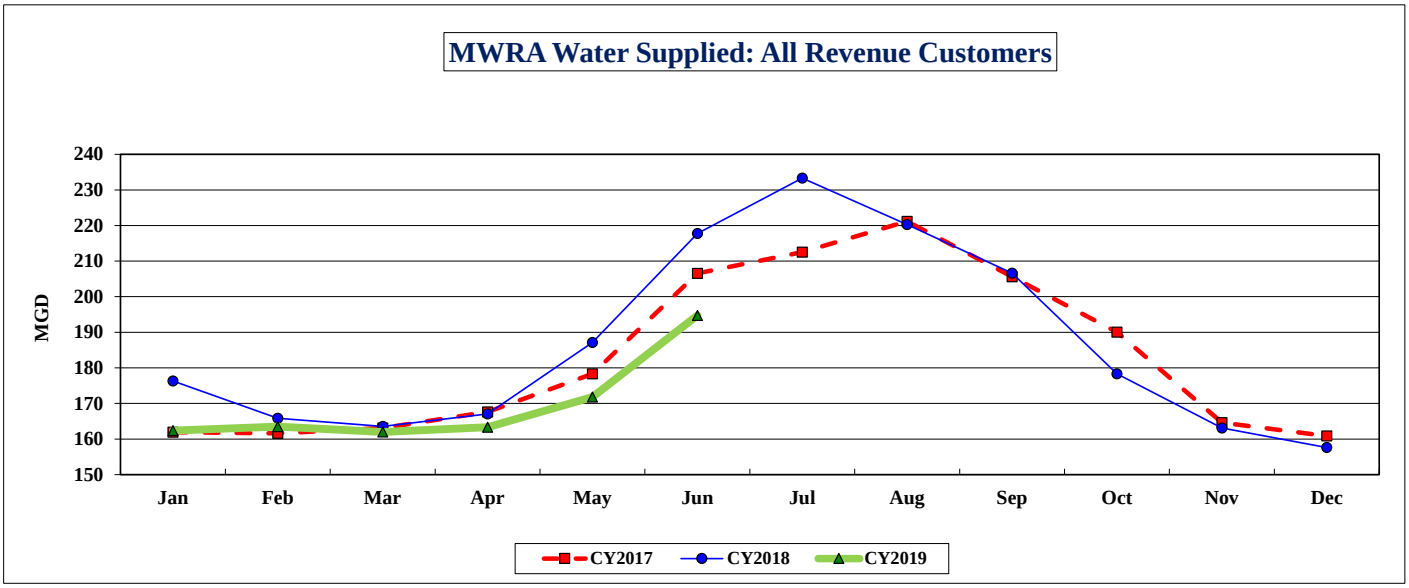


The graph depicts the rolling annual average monthly flow, measured in million gallons per day, exiting the plant. The 12-month rolling average flows during the 4th quarter exceeded the limit of 3.01 due to excessive rains in the region during November and December 2018.

COMMUNITY FLOWS AND PROGRAMS

Total Water Use

4th Quarter - FY19



MGD	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD Average	Annual Average
CY2017	161.941	161.609	163.129	167.613	178.331	206.541	212.533	221.175	205.579	190.053	164.610	160.853	182.969	182.969
CY2018	176.294	165.841	163.539	167.056	187.145	217.776	233.321	220.268	206.586	178.340	163.125	157.612	179.695	186.553
CY2019	162.367	163.492	161.984	163.350	171.782	194.749	0.000	0.000	0.000	0.000	0.000	0.000	169.618	169.618

MG	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD Total	Annual Total
CY2017	5,020.179	4,525.063	5,056.997	5,028.390	5,528.255	6,196.217	6,588.510	6,856.435	6,167.355	5,891.640	4,938.301	4,986.434	66,783.777	66,783.777
CY2018	5,465.125	4,643.548	5,069.719	5,011.695	5,801.508	6,533.267	7,232.949	6,828.310	6,197.590	5,528.550	4,893.739	4,885.979	32,524.861	68,091.978
CY2019	5,033.382	4,577.768	5,021.509	4,900.488	5,325.247	5,842.463	0.000	0.000	0.000	0.000	0.000	0.000	30,700.859	169.618

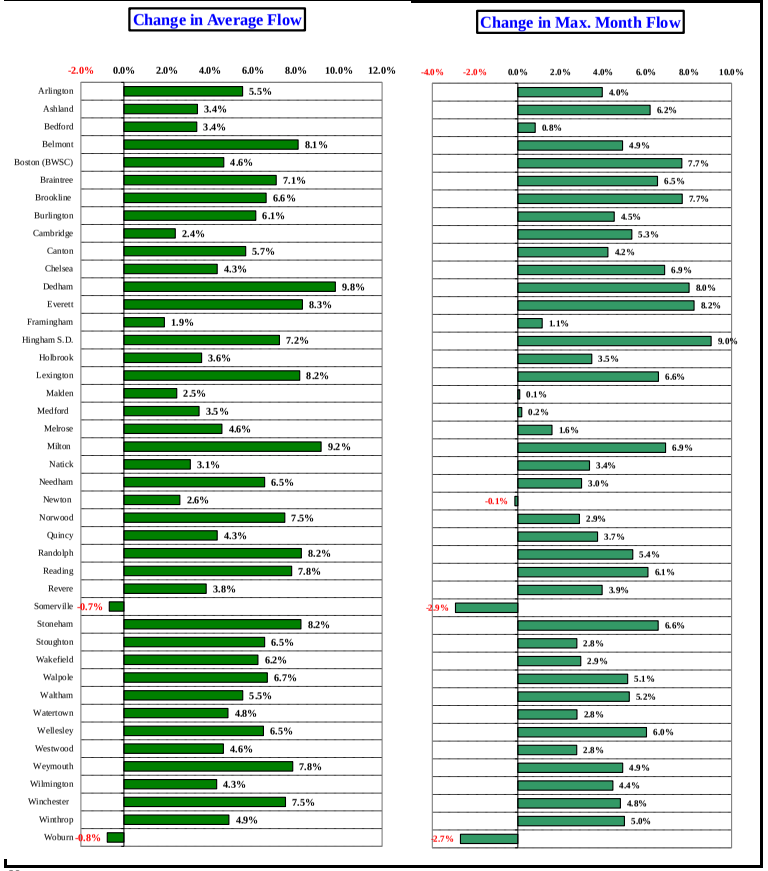
The June 2019 Community Water Use Report was recently distributed to communities served by the MWRA waterworks systems. Each community's annual water use relative to the system as a whole is the primary factor in allocating the annual water rate revenue requirement to MWRA water communities. Calendar year 2019 water use will be used to allocate the FY21 water utility rate revenue requirement.

June 2019 water supplied of 194.7 mgd (for revenue generating users) is down 23.0 mgd or 10.6% compared to June 2018. System-wide year to date consumption for CY19 is lower than CY18 with 169.6 mgd being supplied to MWRA customers through June. This is 10.1 mgd lower than CY18, and is a decrease of 5.6%.

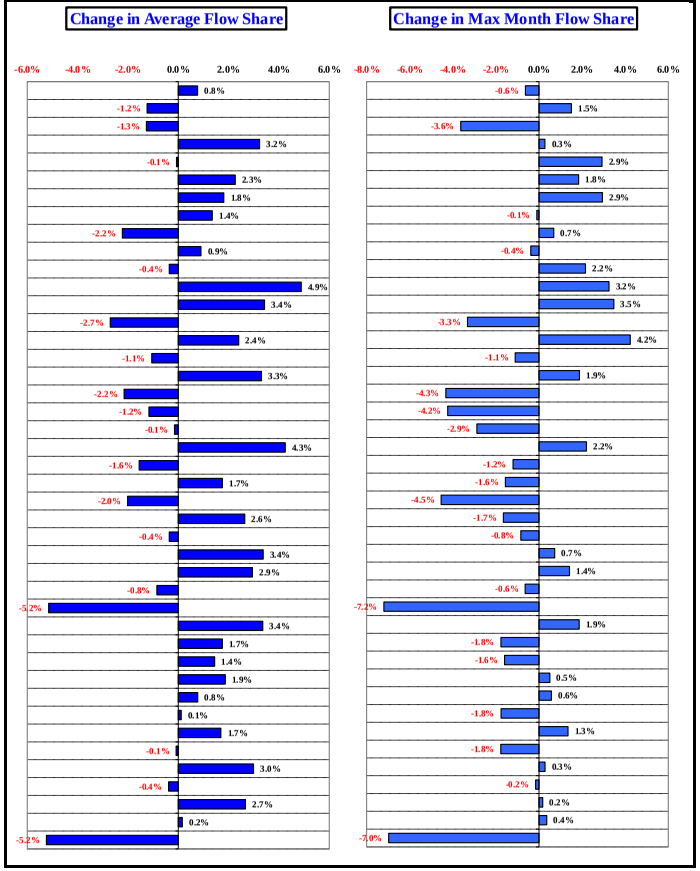
Community Wastewater Flows
4th Quarter - FY19

How Projected CY2019 Community Wastewater Flows Could Effect FY2021 Sewer Assessments [1,2,3]

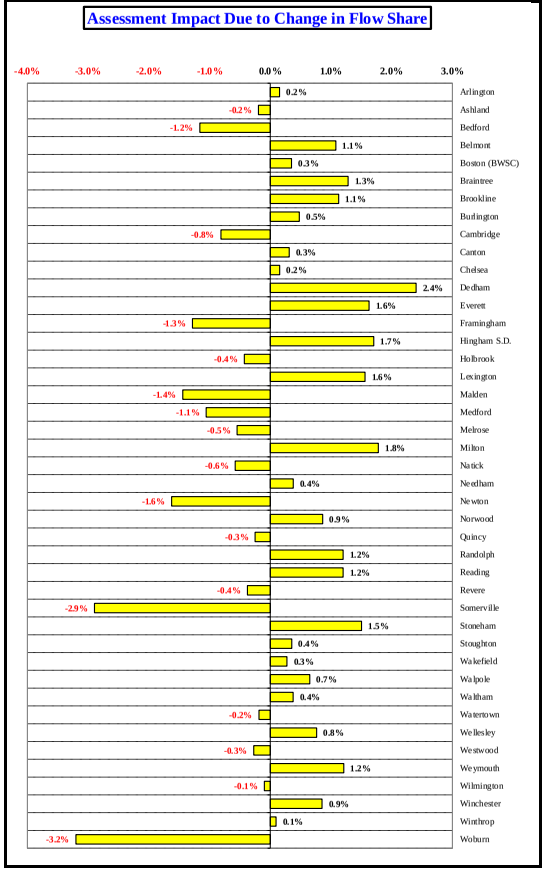
The flow components of FY2021 sewer assessments will be calculated using a 3-year average of CY2017 to CY2019 wastewater flows compared to FY2020 assessments that used a 3-year average of CY2016 to CY2018 wastewater flows.



But as MWRA's sewer assessments are a ZERO-SUM calculation, a community's assessment is strongly influenced by the RELATIVE change in CY2017 to CY2019 flow share compared to CY2016 to CY2018 flow share, compared to all other communities in the system.



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



Notes:

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

[2] Based on CY2016 to CY2019 average wastewater flows as of 08/20/19. Flow data is preliminary and subject to change pending additional MWRA and community review.

[3] CY2016 to CY2018 wastewater flows based on actual meter data. CY2019 flows based on actual meter data for January to June, and project flows for May to December.

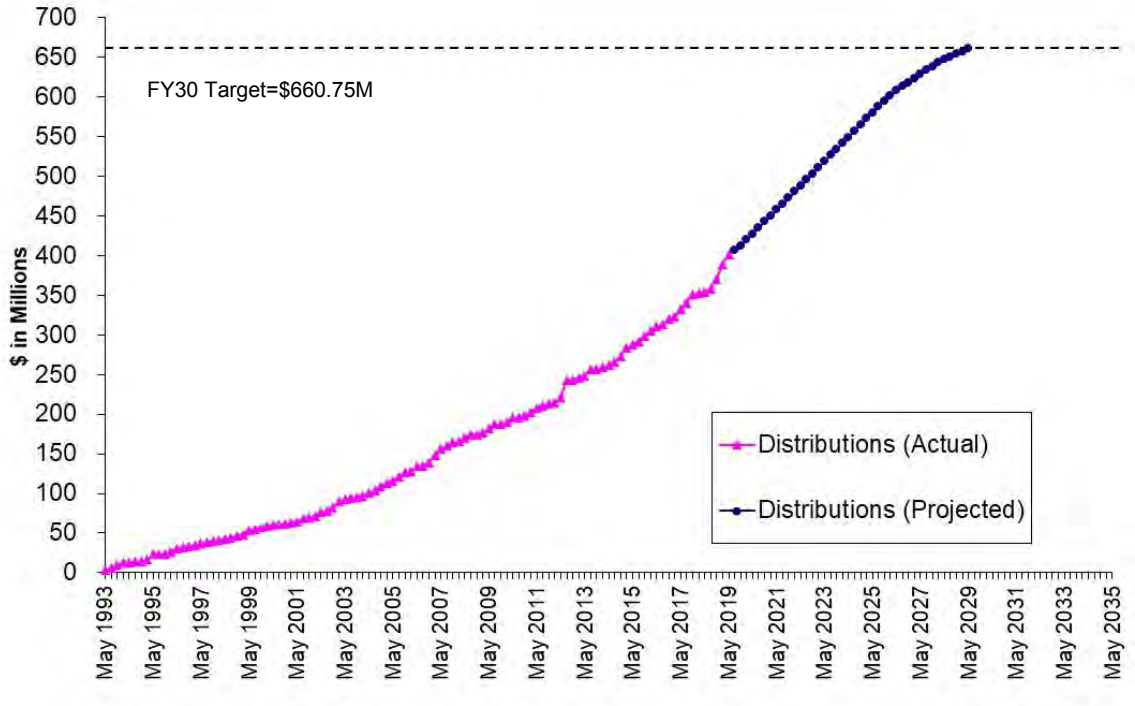
[4] Represents ONLY the impact on the total BASE assessment resulting from the changes in average and maximum wastewater FLOW SHARES.

Community Support Programs
4th Quarter – FY19

Infiltration/Inflow Local Financial Assistance Program

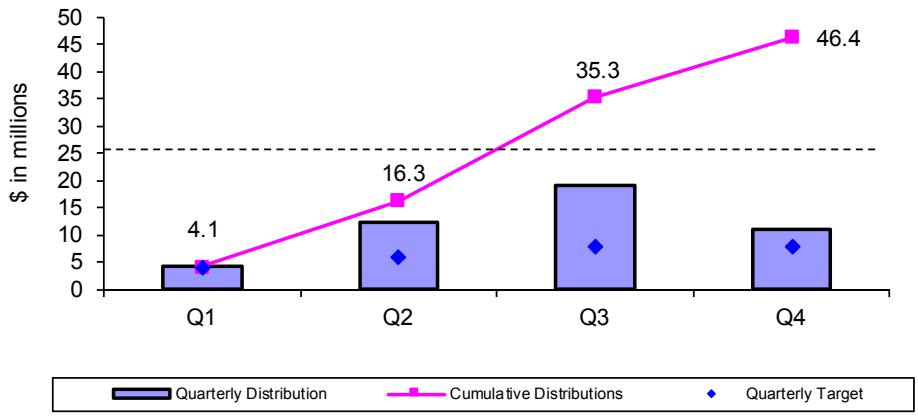
MWRA's Infiltration/Inflow (I/I) Local Financial Assistance Program provides $760.75 million in grants and interest-free loans (average of about $20 million per year from FY93 through FY30) to member sewer communities to perform I/I reduction and sewer system rehabilitation projects within their locally-owned 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 through 12 funds (total $360 million) are distributed as 75% grants and 25% loans with interest-free loans repaid to MWRA over a ten-year period. An additional future Phase 13 provides an additional $100 million in loan-only funds (not yet included in the graph of distributions below).

I/I Local Financial Assistance Program Distribution FY93-FY30



During the 4th Quarter of FY19, $11.1 million in financial assistance (grants and interest-free loans) was distributed to fund local sewer rehabilitation projects in Arlington, Bedford, Burlington, Framingham, Reading, Somerville, Stoughton, Waltham and Wilmington. Total grant/loan distribution for FY19 is $46.4 million. From FY93 through the 4th Quarter of FY19, all 43 member sewer communities have participated in the program and $401 million has been distributed to fund 574 local I/I reduction and sewer system rehabilitation projects. 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.

FY19 Quarterly Distributions of Sewer Grant/Loans

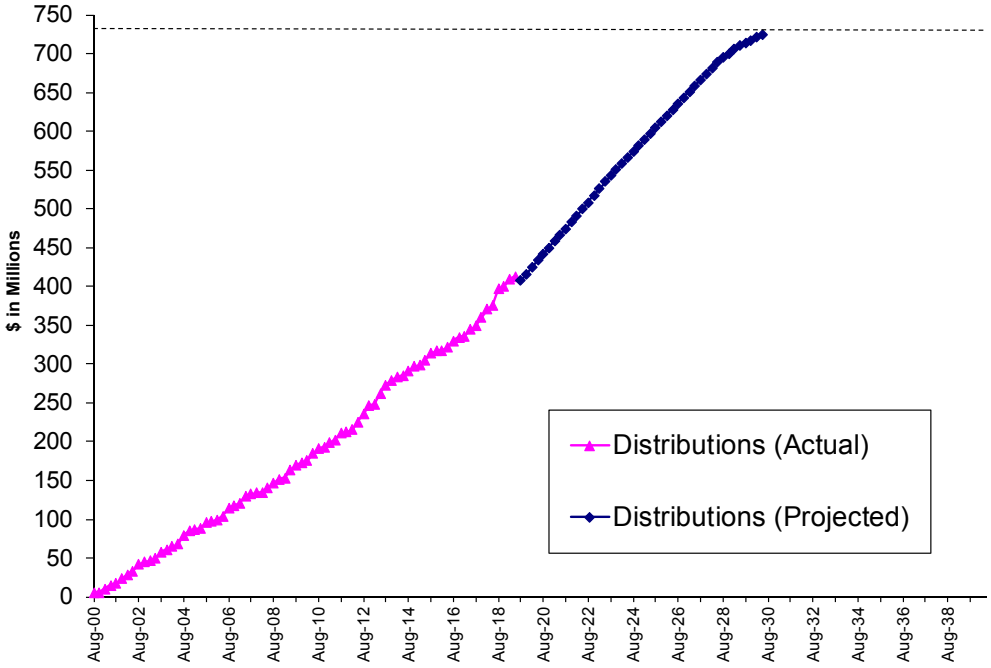


Community Support Programs
4th Quarter – FY19

Local Water System Assistance Program

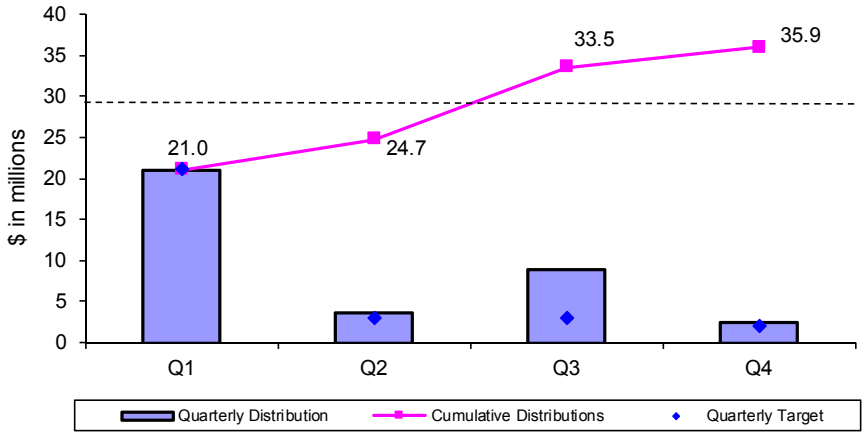
MWRA's Local Water System Assistance Programs (LWSAP) provides $724 million in interest-free loans (an average of about $24 million per year from FY01 through FY30) to member water communities to perform water main rehabilitation projects within their locally-owned water distribution systems. There have 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 FY19, $2.4 million in interest-free loans was distributed to fund local water projects in Chelsea and Quincy. Total loan distribution for FY19 is $35.9 million. From FY01 through the 4th Quarter of FY19, $411 million has been distributed to fund 448 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.

FY19 Quarterly Distributions of Water Loans



Community Support Programs

4th Quarter – FY19

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 as noted in the Table below.

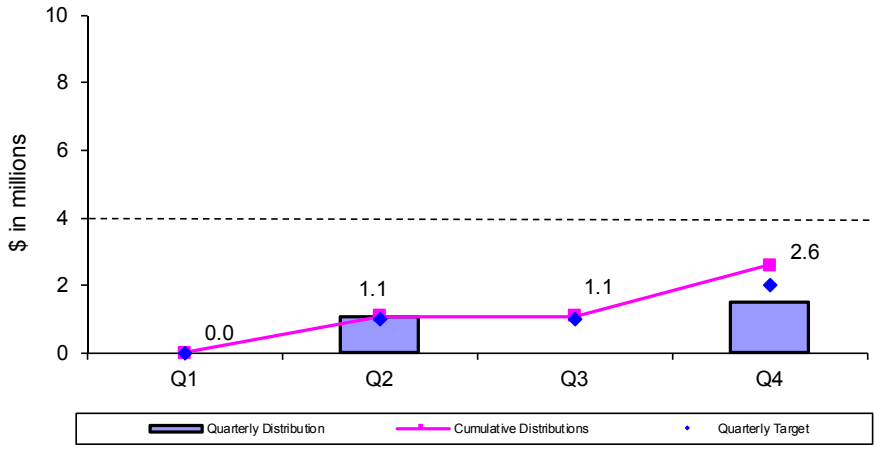
FY18 was the second year of the Lead Loan Program. During FY18, MWRA made five Lead Loan Program distributions as noted in the table below.

FY19 is the third year of the Lead Loan Program. Two Lead Loans were made during the fourth quarter of FY19: $100,000,000 to Marlborough and $0.5 Million to Winthrop.

Summary of Lead Loans:

Marlborough in FY19	$1.0 Million
Winthrop in FY19	$0.5 Million
Chelsea in FY19	$0.1 Million
Everett in FY19	$1.0 Million
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
TOTAL	$11.6 Million

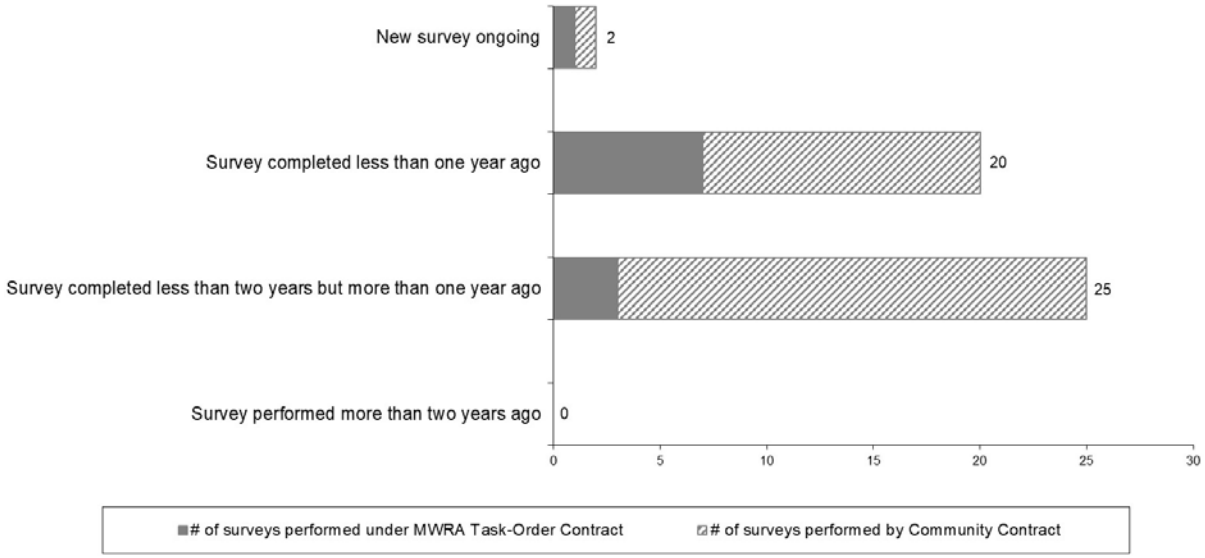
FY19 Quarterly Distributions of Lead Service Line Replacement Loans



Community Support Programs
4th Quarter – FY19

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 FY19, 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	690	10,753	61,917	10,204	83,564
Low-Flow Fixtures (showerheads and faucet aerators)	10,000	1,738	1,635	3,042	1,157	7,572
Toilet Leak Detection Dye Tablets	------	15,202	352	5,008	285	20,847

BUSINESS SERVICES

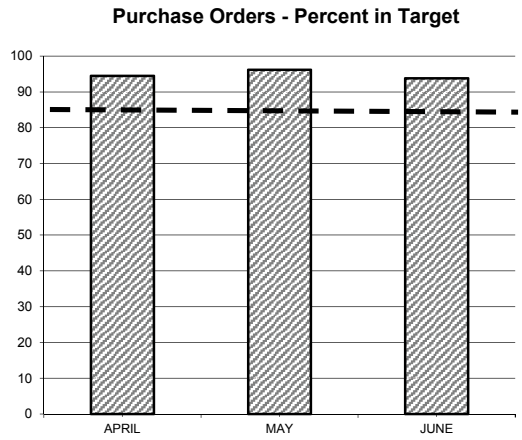
Procurement: Purchasing and Contracts

4th Quarter - FY19

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

Outcome: Processed 95% of purchase orders within target; Average Processing Time was 5.04 days vs. 5.54 days in Qtr 4 of FY18. Processed 42% (8 of 19) of contracts within target timeframes; Average Processing Time was 157 days vs. 122 days in Qtr 4 of FY18.

Purchasing



	No.	TARGET	PERCENT IN TARGET
$0 - $500	683	3 DAYS	94.2%
$500 - $2K	684	7 DAYS	92.9%
$2K - $5K	433	10 DAYS	96.9%
$5K - $10K	45	25 DAYS	91.1%
$10K - $25K	62	30 DAYS	88.7%
$25K - $50K	30	60 DAYS	76.6%
Over $50K	44	90 DAYS	88.6%

The Purchasing Unit processed 1981 purchase orders, 36 less than the 2017 processed in Qtr 4 of FY18 for a total value of $13,034,538 versus a dollar value of $11,823,109 in Qtr 4 of FY18. The purchase order processing target was not met for the $25K - $50K category due to staff summary requirements.

Contracts, Change Orders and Amendments

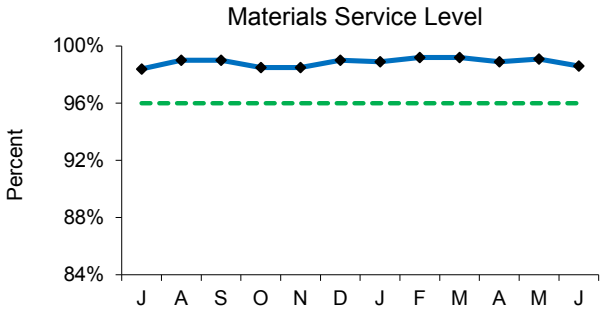
Eleven contracts were not processed within the target timeframes. One contract was delayed due to extensive negotiations of the contract terms as well as the terms of an associated software license. A second contract was delayed due to internal deliberations around qualifying requirements and the transition of the project after the retirement of staff. A third contract was delayed due to the need to address questions and comments from the selected vendor relative to MWRA insurance requirements and indemnification provisions. Another contract was delayed due to delays in receiving the signed contract from the consultant. A fifth contract was delayed due to the additional time required by the consultant to prepare backup documentation. Another contract was delayed due to the resignation of the consultant's proposed Project Manager prior to contract execution and the subsequent review, selection and approval of the replacement Project Manager by the MWRA. A seventh contract was delayed due to additional time required to check the contractor's references and another due to more time than anticipated being needed to edit specifications. A ninth contract was delayed due to delays in obtaining the contractor's bonds and insurance certificates. An additional contract was delayed due to staff retirement and the need for critical revisions to specifications prior to issuance. The final contract was delayed due to the proposer's delays in providing insurance and additional forms.

Procurement processed nineteen contracts with a value of $25,487,021 and five amendments with a value of $592,504. Thirty change orders were executed during the period. The dollar value of all non-credit change orders during Q4 FY19 was $1,932072 and the value of credit change orders was ($1,796,805).

Staff reviewed 54 proposed change orders and 28 draft change orders.

Materials Management

4th Quarter - FY19



The service level is the percentage of stock requests filled. The goal is to maintain a service level of 96%. Staff issued 7,925 (98.9%) of the 8,014 items requested in Q4 from the inventory locations for a total dollar value of $2,186,661.

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 FY19 goal is to reduce consumable inventory from the July '18 base level ($8.4 million) by 2.0% (approximately $168,025), to $8.2 million by June 30, 2019 (see chart below). Reduction fell short of the goal by $14,100.

Items added to inventory this quarter include:

- Deer Island – relays, trip unit, circuit breakers and relay feeders for Electric Shop; check valves, regulators, pressure switches, actuator and gas monitor filters for I&C; reciprocating paint brushes for Machine Shop; compressor, bandsaw blade and thermostat for HVAC; flex couplings and filters for Power and Pump; actuator for Liquid Train.
- Chelsea – Cues lines, camera heads, tow cables, plate clamps, connectors, repair kits, springs, cables, gauges, wire, fittings, filter bags and filter tank for Work Coordination; gate guard pads for Safety; safety locks for Pipeline.
- Southboro – poison ivy towelettes for Grounds Aquaduct Maintenance.

Property Pass Program:

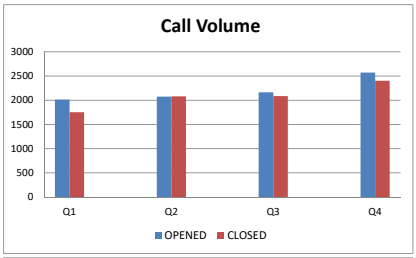
- One audit was conducted during Q4.
- Scrap revenue received for Q4 amounted to $19,302. Year to date revenue received amounted to $55,114.
- Revenue received from online auctions held during Q4 amounted to $76,678. Year to date revenue received amounted to $433,938.

Items	Base Value July-18	Current Value w/o Cumulative New Adds	Reduction / Increase To Base
Consumable Inventory Value	8,401,259	8,247,334	-153,925
Spare Parts Inventory Value	8,884,367	9,086,035	201,668
Total Inventory Value	17,285,626	17,333,369	47,743

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.

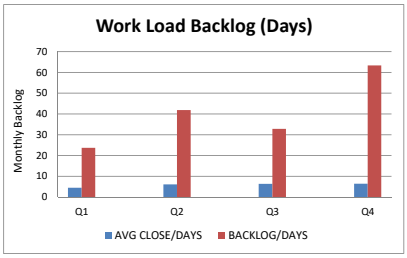
MIS Program

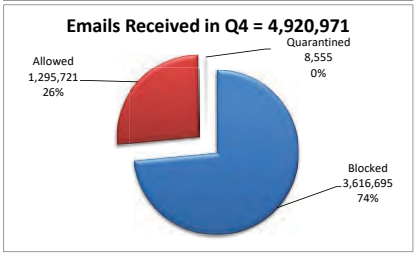
4th Quarter FY19



Performance & Backlog for Q4

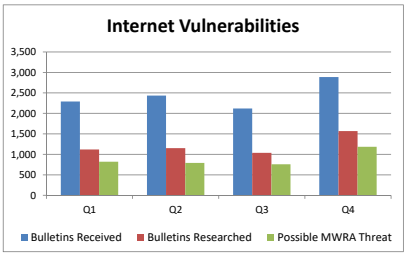
- 93.47% of open calls were closed.
- Call closure averaged 6.4 days.
- Priority 1 & 2 Service Level Agreements (SLA) were not met because of priorities and delayed closure. Workarounds provided.





Information Security for Q4

- In Q4, pushed security fixes/updates to desktops/servers protecting against 204 vulnerabilities.
- McAfee quarantined 9 distinct viruses from 8 PCs. PCs are current with antivirus signatures for known malware.



Infrastructure:

Desktop Refresh: PC deployments are 99% complete.

Audio/Visual Upgrades: Chelsea Muster Room and CNY completed. Designs being reviewed for balance of conference rooms.
External Facing Server Hardware Replacement: 18 servers migrated to new infrastructure hardware. Telog system to be migrated once 4G migration has completed.

Network Router Replacement: Router replacements at 11 sites completed.

Cell Phone Upgrades: Completed.

IPhone Upgrades: Completed 73% of iPhone 8 upgrades.

Infrastructure Upgrades: Hardware being procured for Southboro, Clinton, and JCWTP.

DI Ops Hardware Segmentation: Hardware received and scheduled for installation in July.

Applications/Library & Records Center/Training:

Enterprise Content Management (ECM)/e-Construction: Working on business process workflows and/or use case documentation of existing E&C Department processes and data migration analysis. 47 use cases and 90 workflows are completed or nearly completed. 21 data sources are identified and documented and 200+ reports have been analyzed. Data sources include 4 InfoStar Document management systems and 17 related databases, which are intended to be replaced with the new system. Strategized an RFP process with Gartner and began reviewing over 600 possible critical capabilities identified by Gartner.

Contracts Management: Professional Services Contracts are the last significant contract type remaining to be implemented in the new Contracts Management application that already is being used for non-professional services, and Chapter 30 and Chapter 149 construction contracts. Completed preliminary set of user tests with Procurement Director and Subject Matter Experts (SMEs). Established final requirements for Professional Services bid tab access.

Dental Certifications Application: New federal regulations requiring sewer discharge permits for dental offices require an update to the PIMS permitting application. Requirements draft completed and sent to users and IT staff to review. Began working on a new user requirement to revise registration functionality to replicate that used by the state of Connecticut that allows dental offices to designate registration administrators.

GIS: GISPortal Viewer was updated to included two MassGIS layers, namely Activity and Use Limitation (AUL) and Chapter 21E sites,to aid in-house construction project planning. These new features will help identify MWRA pipelines within the mapped AUL area.

Lawson: The Lawson System Foundation Core Technology (LSFCT) has been upgraded to support Multi Browser (MS-Internet Explorer & Google Chrome) capability for the Lawson Portal.

Telog Application System Assessment: MWRA's Telog Application system assessment was completed by the vendor Engineering firm. A final assessment report was delivered. The review of the report is in process.

Library & Records Center: Library: undertook 22 research requests, supplied 75 new books for circulation, provided 49 books and reports on loan, accessed and distributed 21 articles, and 4 new standards. The MWRA Library Portal supported 780 end-user searches.

Record Center (RC): added 162 new boxes, 94 jars of soil samples, and 38 rock-core samples. Staff executed 22 rush request (info needed within 24hrs) scanned/emailed 147 pages of technical information and shredded nine, 65 gallon bins of confidential documents on site. The RC manager attended 1 RCB meeting and taught 3 record management classes.

IT Training: For the quarter, 177 staff (287 YTD)attended 28 (52 YTD) classes. 20% of the workforce has attended at least one class year-to-date. Windows 10 training were conducted in Chelsea, Charlestown, Deer Island, and Southboro. Windows 10 Job aids were created for removing printers and changing passwords.

Legal Matters

4th Quarter - FY19

PROJECT ASSISTANCE

Real Estate, Contract, Environmental and Other Support:

- **8(m) Permits**: Reviewed fifty-four (54) 8(m) permits.

- **Real Property**: Drafted grant of access easement and memorandum of understanding related to the potential relocation of MWRA's access easement at the Cumberland Farms, Inc. property located at 777 Dedham Street in Canton, MA for the future redevelopment of the property. Reviewed certificate of estoppel and fifth and sixth amendments to lease for MWRA's records center located at 34 St. Martin Drive, Marlborough, Massachusetts. Drafted two grants of temporary easements and two offers of purchase pursuant to M.G.L c. 79 for the acquisition of two temporary easements in Dorchester and Milton needed for the construction of the Dorchester Interceptor Sewer Rehabilitation Project (MWRA Contract No. 7279). Finalized license from Baker Square Condominium Association related to MWRA's construction activities related to Dorchester Interceptor Sewer Rehabilitation (MWRA Contract No. 7279). Drafted license from Fore River Railroad Corporation to MBTA to allow MBTA to install, operate, and maintain one set of two transponders on the portion of the FRRC tracks in Braintree where the FRRC tracks meet the MBTA's Greenbush line tracks. Finalized easement language for MBTA's grant of a water easement to MWRA in Ball Square related to MBTA's relocation of a portion of MWRA's Section 65 water main as part of the MBTA's Green Line Extension Project. Reviewed Quabbin Watershed Preservation Restriction, W-001198, related to Pope property on New Salem Road in Petersham, MA, Quabbin Watershed Preservation Restriction Acquisition, W-001177, related to Butterworth property off Pat Connor Road in Petersham, MA, and Wachusett Watershed Fee Acquisition, W-001179, related to Rotti property off Fairbanks Street in West Boylston, MA. Drafted six (6) one-day licenses for public events on the Harborwalk Perimeter Pathway at DITP.

- **Boston Harbor Case**: Reviewed Semiannual Compliance and Progress Report and Semiannual CSO Discharge Report No. 2. Reviewed MWRA's LTCP CSO performance assessment semiannual report 2.

- **Environmental**: Reviewed DEP's Tentative Determinations to adopt variances for CSO discharges to Alewife Brook/Upper Mystic River and the Lower Charles River/Charles River Basin. Reviewed PCB notices of restriction pursuant to 40 CFR § 761.61 for Wachusett Dam and for Alewife Brook Pump Station.

- **Energy**: Prepared draft Demand Demonstration Project-Utility Tariff Optimization Service and Site License Agreement for two potential battery storage projects at MWRA facilities. Processed the re-execution of MWRA's Oakdale and Cosgrove Hydro Qualifying Facility Agreements with National Grid, which allow for National Grid's ongoing purchase of excess hydroelectric energy generated by MWRA's Oakdale and Cosgrove hydro facilities.

- **Public Records Requests**: During the fourth quarter of 2019, MWRA received one hundred and forty-three (143) and responded to one hundred and forty-four (144) public records requests.

LABOR, EMPLOYMENT AND ADMINISTRATIVE

New Matters
Four demands for arbitration were filed.

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

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.

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

LITIGATION/CLAIMS

New lawsuits/claims: Shea v. MWRA: Suffolk Sup. Ct., No. 2019 CV 01847: Plaintiff initiated an action against MWRA related to his termination. Plaintiff's complaint alleges discrimination on the basis of his race and record handicap in violation of Chapter 151B. Plaintiff's complaint also alleges unlawful retaliation for seeking workers compensation benefits, wrongful termination based on violation of public policy and violation of earned sick time. MWRA denies the Plaintiff's allegations and asserts that the termination was for legitimate reasons, with no discriminatory animus or retaliation on the part of MWRA. Plaintiff seeks trial by jury.

Significant Developments

(Current Employee) v. MWRA: Suffolk Sup. Ct., No. 16-03708E: Depositions of all MWRA witnesses were completed during the month of May and discovery is now closed.

DaPrato v. MWRA: Suffolk Sup. Ct., No. 2015 CV 3687 D: The Supreme Judicial Court issued its opinion on June 5, 2019 denying MWRA's appeal in full and affirming the jury's judgment and the court's award of liquidated damages, attorneys' fees and costs.

BHD/BEC JV2015 v. MWRA: Suffolk Sup. Ct., No. 2018 CV 03477: The parties have entered into a settlement agreement to resolve plaintiff contractor's claims for compensation arising out of alleged unforeseen subsurface conditions and the solar equipment foundations on the Wachusett Aqueduct Pumping Station project. Final papers dismissing the lawsuit are expected to be filed with the Suffolk Superior Court in July 2019.

Closed Cases/Claims: Law Offices of Burton J. Hass v. MWRA, Frederick A. Laskey, et al.; Suffolk Sup. Ct., No. 1984-CV-634H: By order dated April 11, 2019, the Court allowed MWRA's motion to dismiss Plaintiff's complaint against MWRA having received no opposition from the Plaintiff.

Subpoenas During the Fourth Quarter of FY 2019, no subpoenas were received, one subpoena was closed, and no subpoenas were pending at the end of the Fourth Quarter FY 2019.

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

SUMMARY OF PENDING LITIGATION MATTERS

TYPE OF CASE/MATTER	As of June 2019	As of March 2019	As of Dec 2018
Construction/Contract/Bid Protest (other than BHP)	3	3	3
Tort/Labor/Employment	5	5	4
Environmental/Regulatory/Other	2	2	2
Eminent Domain/Real Estate	0	0	0
Total	**10**	**10**	**9**
Other Litigation matters (restraining orders, etc.)	1	1	2
Total – all pending lawsuits	**11**	**11**	**11**
Claims not in suit:	1	1	2
Bankruptcy	0	0	0
Wage Garnishment	4	4	4
TRAC/Adjudicatory Appeals	1	1	1
Subpoenas	0	1	1
TOTAL – ALL LITIGATION MATTERS	**17**	**18**	**19**

TRAC/MISC.

New Appeals: There is one new appeal:
The Midtown Hotel; MWRA Docket No. 19-02

Settlement by Agreement Of Parties Howard Johnsons Hotel – Quincy; MWRA 19-01

Stipulation of Dismissal No Joint Stipulation of Dismissals filed.

Notice of Dismissal Fine paid in full No Notices of Dismissal, Fine Paid in Full.

Tentative Decision There are no Tentative Decisions issued in the 4th Quarter FY19.
Final Decisions There are no Final Decisions issued in the 4th Quarter FY19.

INTERNAL AUDIT AND CONTRACT AUDIT ACTIVITIES
4th Quarter - FY19

Highlights
During the 4th quarter FY19, IA completed a review of Purchase Card activity to determine compliance with current policies and procedures. Management has actively closed 9 out of the 11 recommendations made, including amending the manual to provide documentation requirements for management authorizations for certain purchases, reminding cardholders of importance of timeliness when submitting monthly reconciliations for review and approval, and specifying record retention requirements. In addition, IA also completed 3 consultant preliminary reviews, 2 construction labor burden reviews, a prevailing wage review of the cleaning contractor, the CNY lease true-up for 2018 and the NEFCo claim due to storage reductions.

Status of Recommendations
During FY19, 27 recommendations were closed of which 4 are 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.

All Open Recommendations Pending Implementation – Aging Between 0 and 48 Months

Report Title (issue date)	Audit Recommendations		
	Open	Closed	Total
MIS Mobile Equipment Asset Tracking (9/26/16)	1	11	12
Wright Express (WEX) Credit Card Fuel Purchases (11/16/16)	1	12	13
Purchase Card Activity on Deer Island (3/31/17)	2	13	15
Review of Uniform Debit Card Program (3/30/18)	2	4	6
Review of MWRA Procedures on Payments for Police Details (5/23/18)	1	0	1
Overtime & Timesheet Review (6/30/18)	2	14	16
Fleet Services Process Review (6/30/18)	4	1	5
Fuel Use & Mileage Tracking (12/31/18)	7	1	8
Review of Purchase Card Activity (5/23/19)	2	9	11
Total Recommendations	***22***	***65***	***87***

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.

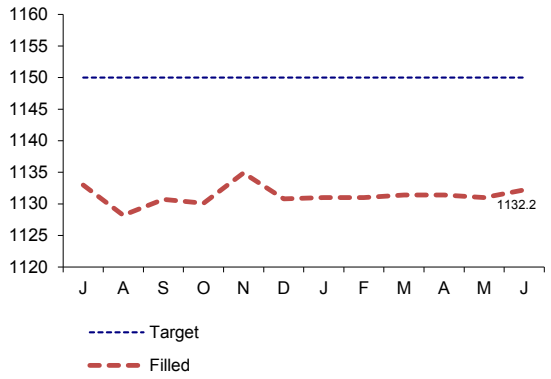
Cost Savings	FY15	FY16	FY17	FY18	FY19 Q4	TOTAL
Consultants	$87,605	$88,312	$272,431	$118,782	$262,384	$829,514
Contractors & Vendors	$1,146,742	$1,772,422	$3,037,712	$1,323,156	$3,152,884	$10,432,916
Internal Audits	$543,471	$220,929	$224,178	$204,202	$210,063	$1,402,843
Total	**$1,777,818**	**$2,081,663**	**$3,534,321**	**$1,646,140**	**$3,625,331**	**$12,665,273**

OTHER MANAGEMENT

Workforce Management

4th Quarter - FY19

FTE Tracking

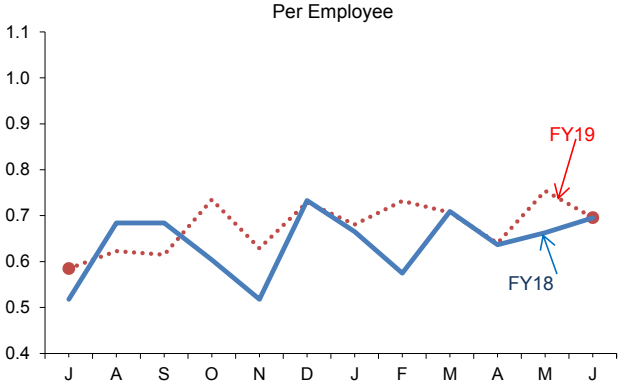


FY19 Target for FTE's = 1150
FTE's as of June 2019 = 1132.2
Tunnel Redunancy as of June 2019 = 7.0

Position Filled by Hires/Promos & Transfer for YTD

	Pr/Trns	Hires	Total
FY17	155 (68%)	72 (32%)	227
FY18	118 (61%)	74 (39%)	192
FY19	113 (60%)	76 (40%)	189

Average Monthly Sick Leave Usage
Per Employee

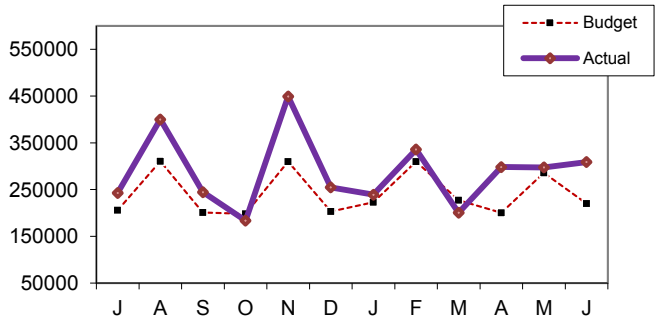


Average monthly sick leave for the 4th Quarter of FY19 increased as compared to the 4th Quarter of FY18 (8.12 to 7.68)

	Number of Employees	YTD	Annualized Total	Annual FMLA %	FY18
Admin	137	7.79	7.79	14.1%	6.6
Aff. Action	5	7.05	7.05	13.5%	7.1
Executive	4	2.28	2.28	22.6%	3.3
Finance	32	6.28	6.28	0.0%	6.1
Int. Audit	6	4.06	4.06	5.8%	4.9
Law	13	7.80	7.80	9.0%	6.9
OEP	4	5.97	5.97	100.0%	3.6
Operations	933	8.36	8.36	16.8%	7.7
Tunnel Red	7	8.11	8.11	70.4%	0
Pub. Affs.	11	4.45	4.45	15.2%	10.4
MWRA Avg	**1152**	**8.13**	**8.13**	**16.4%**	**7.7**

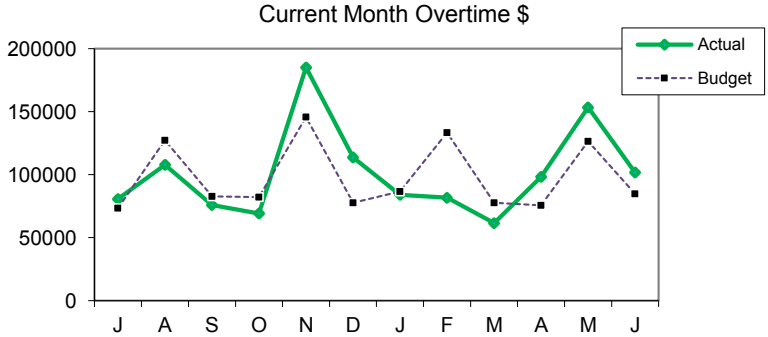
Percent of sick leave usage for FY19, attributable to Family and Medical Leave Act (FMLA) is 16.4% .

Field Operations
Current Month Overtime $



Total Overtime for Field Operations for the fourth quarter of 2019 was $904,254 which is $198k over budget. Emergency overtime was $502k, which was $131k over budget. Rain events totaled $369k, Emergency Maintenance was $42k, Emergency operations was $30k, and CSO activation was $24k. Coverage overtime was $201k, which was $36k over budget, reflecting the month's shift coverage requirements. Planned overtime was $201k or $30k over budget, Maintenance off hours work was $94k, planned operations was $25k, community assistancec was $23k. YTD, FOD has spent $3,454,804 on overtime which is $560k over budget.

Deer Island Treatment Plant
Current Month Overtime $

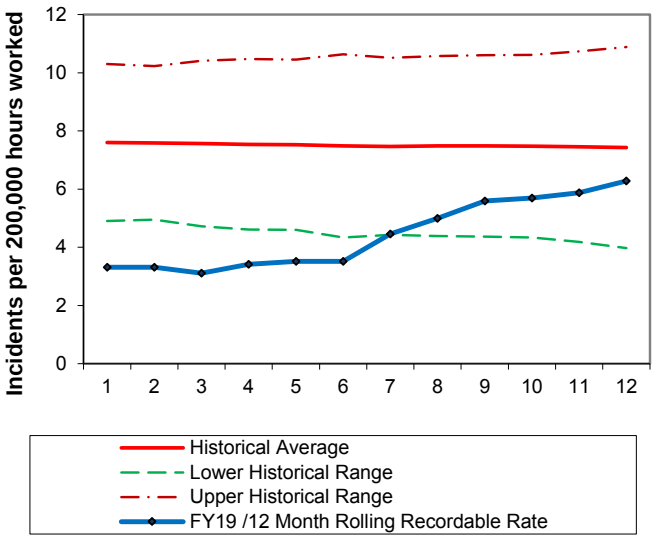


Deer Island's total overtime expenditure for the fourth quarter was $353,442, which was $66k or 23.2% over budget for the quarter. During the fourth quarter Deer Island experienced higher than anticipated unplanned emergencies/storm coverage of $66k and shift coverage of $18k. This was offset by lower spending for planned/unplanned overtime of ($18k) for the quarter. YTD Deer Island's overtime spending is $1,213,319 which is $39k or 3.3% over budget mostly due to higher spending for storm coverage of $215k primarily in November, December, April, and May due to high rains and flows and shift coverage of $32k; offset by lower planned/unplanned overtime of ($208k).

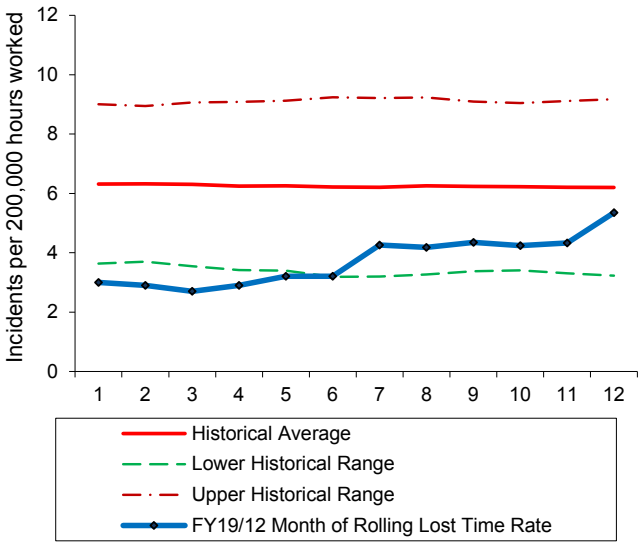
Workplace Safety

4th Quarter - FY19

Recordable Injury & Illness Rates



Lost Time Injury & Illness Rates



1 “Recordable" incidents are all work-related injuries and illnesses which result in death, loss of consciousness, restriction of work or motion, transfer to another job, or require medical treatment beyond first aid. Each month this rate is calculated using the previous 12 months of injury data.

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. Each month this rate is calculated using the previous 12 months of injury data.

3 The “Historical Average” is computed using the actual MWRA monthly incident rates for FY99 through FY18. The “Upper” and “Lower Historical Ranges” are computed using these same data – adding and subtracting two standard deviations respectively.

4 With Changes in state law, in February 1, 2019, MWRA began record keeping and reporting according to Federal OSHA standards for injury and illness record keeping. Strictly adhering to the federal OSHA reporting regulation has caused an increase in recorded injuries and illnesses. This increase is causing both the Recordable injury and illness Rate and the Lost TIme Injury and Illness rate to trend higher than in past years but does not necessarily mean there is an increase in injuries or illnesses. OSHA injuries and illnesses, and lost time are recorded differently than the Massachusetts Workers' Compensation standards and could result in an increase in the OSHA rate while the Workers' Compensation claims are decreasing. Over time, the rise on the charts should stabilize as new data replaces the older data..

WORKERS COMPENSATION HIGHLIGHTS

	4th Quarter Information		
	New	**Closed**	**Open Claims**
Lost Time	2	26	46
Medical Only	28	31	28
Report Only	23	25	
	QYTD		**FYTD**
Regular Duty Returns	11		39
Light Duty Returns	0		0

COMMENTS:

Regular Duty Returns

APR	4	Employees returned to full duty/no restrictions
MAY	5	Employees returned to full duty/no restrictions
JUNE	2	Employees returned to full duty/no restrictions

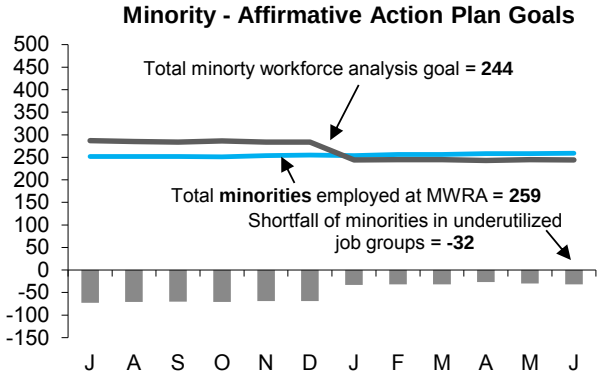
Light Duty Returns

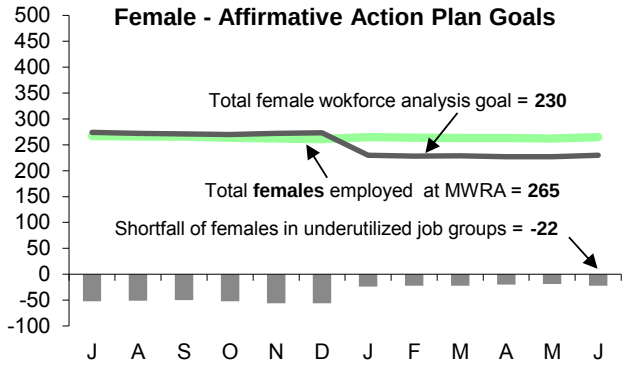
APR N/A
MAY N/A
JUNE N/A

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

MWRA Job Group Representation

4th Quarter - FY19





Highlights:

At the end of Q4 FY19, 7 job groups or a total of 32 positions are underutilized by minorities as compared to 8 job groups for a total of 44 positions at the end of Q4 FY18; for females 6 job groups or a total of 22 positions are underutilized females as compared to 7 job groups or a total of 62 positions at the end of Q4 FY18. During Q4, 7 minorities and 6 females were hired. During this same period 4 minorities and 3 females were terminated.

Underutilized Job Groups - Workforce Representation

Job Group	Employees as of 6/30/2019	Minorities as of 6/30/2019	Achievement Level	Minority Over or Under Underutilized	Females As of 6/30/2019	Achievement Level	Female Over or Under Underutilized
Administrator A	23	2	3	-1	10	7	3
Administrator B	25	1	5	-4	7	5	2
Clerical A	28	10	6	4	25	18	7
Clerical B	25	8	5	3	7	10	-3
Engineer A	80	29	16	13	17	19	-2
Engineer B	57	17	13	4	12	11	1
Craft A	116	18	22	-4	0	3	-3
Craft B	148	21	28	-7	3	7	-4
Laborer	70	19	16	3	4	3	1
Management A	97	20	23	-3	32	38	-6
Management B	43	9	9	0	10	5	5
Operator A	64	4	13	-9	1	1	0
Operator B	69	18	11	7	4	1	3
Professional A	29	3	7	-4	18	14	4
Professional B	162	45	42	3	80	60	20
Para Professional	57	18	12	6	27	16	11
Technical A	52	14	12	2	7	11	-4
Technical B	7	3	1	2	1	1	0
Total	**1152**	**259**	**244**	**47/-32**	**265**	**230**	**57/-22**

AACU Candidate Referrals for Underutilized Positions

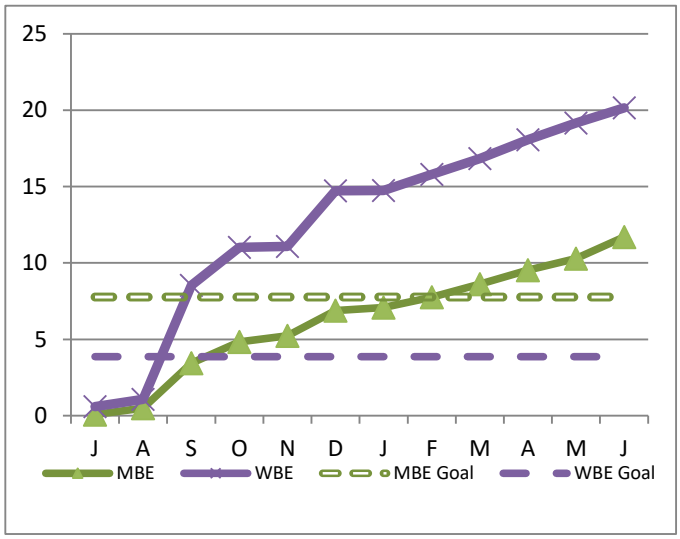
Job Group	Title	# of Vac	Requisition Int. / Ext.	Promotions/Transfers	AACU Ref. External	Position Status
Craft A	Sr. WDS Foreman	1	Int	1	0	Promo =WM
Craft A	Unit Supervisor, Instrumentation	1	Int	1	0	Promo =WM
Craft B	Plumber/Pipefitter	2	Ext.	0	0	2NH = (BM) (WM)
Craft B	HVAC Specialist	1	Ext	0	0	NH = WM
Craft B	Heavy Equipment Operator	1	Int	1	0	Promo =WM
Craft B	Jr. Instrunment Technician	1	Ext	0	0	NH = WM
Management A	Program Manager	1	Int.	1	0	Promo = WF
Management A	Program Manager, Energy	1	Int/Ext	0	0	NH = AM
Management A	Deputy Contracts Manager	1	Ext	0	0	NH = BF
Management B	Asset Control Supervisor	1	Int.	1	0	Promo = WF
ParaProfessional	Administrative Systems Coordinator	1	Ext.	0	1	NH = BF
Professional A	Sr. Contracrs Admninstrator	1	Int.	1	0	Promo =WF
Professional B	Manager, Employment	1	Int	1	0	Promo =BF
Operator A	Transmission & Treatment Operator	1	Int/Ext	0	0	NH = WM
Operator A	Area Supervisor	2	Int/Ext	2	0	2LT = (2WM)
Technical A	C&C Technicain	1	Int.	1	0	LT =WM

MBE/WBE Expenditures
4th Quarter - FY19

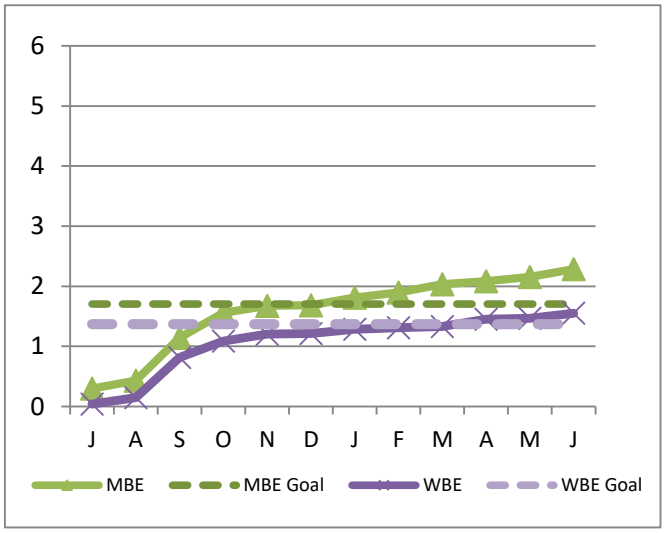
MBE/WBE targets are determined based on annual MWRA expenditure forecasts in the procurement categories noted below. The goals for FY19 are based on 85% of the total construction and 75% of the total professional projected spending for the year. Certain projects have been excluded from the goals as they have no MBE/WBE spending goals.

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

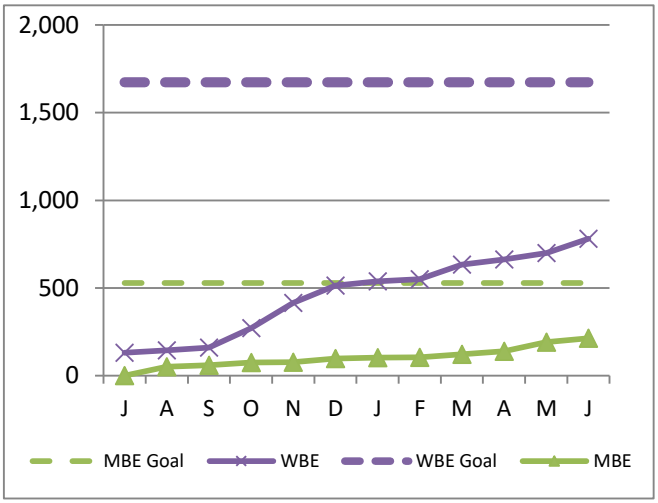
Construction (millions $)



Professional Services (millions $)



Goods/Services (Thousands $)



FY19 spending and percentage of goals achieved, as well as FY18 performance are as follows:

MBE					WBE			
FY19 YTD		**FY18**			**FY19 YTD**		**FY18**	
Amount	**Percent**	**Amount**	**Percent**		**Amount**	**Percent**	**Amount**	**Percent**
11,699,641	150.6%	12,337,140	169.4%	Construction	20,152,509	521.8%	15,875,719	438.4%
2,285,171	134.1%	1,680,583	89.2%	Prof Svcs	1,551,120	113.2%	1,196,643	79.0%
213,198	40.3%	183,744	39.8%	Goods/Svcs	780,760	46.7%	786,485	78.9%
14,198,010	142.0%	14,201,467	298.4%	**Totals**	22,484,389	325.6%	17,858,847	596.3%

FY19 MBE/WBE dollar totals do not include MBE and WBE payments to prime contractors and consultants.

MWRA FY19 CEB Expenses

4th Quarter – FY19

As of June 2019, total expenses are $758.8 million, $9.1 million or 1.2% lower than budget, and total revenue is $772.3 million, $4.4 million or 0.6% over budget, for a net variance of $13.5 million.

Expenses –

Direct Expenses are $233.7 million, $5.9 million or 2.5% under budget.

- **Wages & Salaries** are under budget by $4.7 million or 4.4%. Regular pay is $4.7 million under budget, due to lower head count, and timing of backfilling positions. YTD through June, the average Full Time Equivalent (FTE) positions was 1,136, nineteen fewer than the 1,155 FTE's budgeted.
- **Utilities** expenses are $1.6 million or 6.9% over budget due to overspending of $1.4 million on electricity primarily at Deer Island, $890k, and in Field Operations, $457k, reflecting a new contract retroactive to November 2018.
- **Professional Services** expenses are $1.5 million under budget or 19.3%, primarily due to under spending in Other Professional Services of $569k, Legal Services of $305k, Engineering of $224k, Lab Testing & Analysis of $216k, and Computer System Consultants of $155k.
- **Ongoing Maintenance** expense $1.6 million under budget or 5.0%, reflecting the timing of projects.
- **Fringe Benefits** expenses are $1.2 million or 5.6% under budget reflecting lower health insurance cost of $1.1 million again due to lower head count.
- **Other Services** expenses are $704k or 3.1% over budget reflecting higher processing volume at pelletization plant of $1.2 million, partially offset by lower spending on Telecommunication Services of $326k and Other Services of $276k.
- **Overtime** expenses are $761k or 17.1% over budget due to wet weather events.

Indirect Expenses are $43.4 million, $2.5 million or 5.5% under budget reflecting lower than budgeted Watershed Reimbursement of $3.0 million, partially offset by increased spending on Insurance of $650k due to greater than anticipated claims.

Debt Service Expenses totaled $481.7 million, $0.6 million under budget after the transfer of $16.7 million to the Defeasance Account. Of the $16.7 million transferred to the Defeasance Account, $7.2 million represents year to date savings due to lower than budgeted variable interest rates and $7.4 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 $772.3 million, $4.4 million higher than budget, primarily due to greater than budgeted investment income reflecting higher returns of $3.4 million, the Disposal of Equipment of $427k, and Miscellaneous Revenue of $209k.

	June 2019 Year-to-Date			
	Period 12 YTD Budget	Period 12 YTD Actual	Period 12 YTD Variance	%
EXPENSES				
WAGES AND SALARIES	$ 107,032,021	$ 102,331,904	$ (4,700,117)	-4.4%
OVERTIME	4,447,554	5,208,556	761,002	17.1%
FRINGE BENEFITS	21,173,571	19,982,221	(1,191,350)	-5.6%
WORKERS' COMPENSATION	2,422,609	2,717,568	294,959	12.2%
CHEMICALS	10,830,452	10,891,948	61,496	0.6%
ENERGY AND UTILITIES	22,868,632	24,446,278	1,577,646	6.9%
MAINTENANCE	32,258,727	30,650,570	(1,608,157)	-5.0%
TRAINING AND MEETINGS	455,770	499,836	44,066	9.7%
PROFESSIONAL SERVICES	7,675,976	6,194,703	(1,481,273)	-19.3%
OTHER MATERIALS	7,381,098	6,987,854	(393,244)	-5.3%
OTHER SERVICES	23,065,411	23,769,299	703,888	3.1%
TOTAL DIRECT EXPENSES	**$ 239,611,821**	**$ 233,680,737**	**$ (5,931,085)**	**-2.5%**
INSURANCE	$ 2,099,064	$ 2,748,983	$ 649,919	31.0%
WATERSHED/PILOT	26,406,427	23,411,908	(2,994,519)	-11.3%
HEEC PAYMENT	1,386,832	1,191,990	(194,842)	-14.0%
MITIGATION	1,614,262	1,614,263	1	0.0%
ADDITIONS TO RESERVES	1,881,797	1,881,797	-	0.0%
RETIREMENT FUND	7,000,000	7,000,000	-	0.0%
POST EMPLOYEE BENEFITS	5,574,152	5,574,152	-	0.0%
TOTAL INDIRECT EXPENSES	**$ 45,962,534**	**$ 43,423,093**	**$ (2,539,441)**	**-5.5%**
STATE REVOLVING FUND	$ 89,380,363	$ 84,227,800	$ (5,152,563)	-5.8%
SENIOR DEBT	272,633,982	287,497,793	14,863,811	5.5%
DEBT SERVICE ASSISTANCE	(944,726)	(1,834,965)	(890,239)	94.2%
CURRENT REVENUE/CAPITAL	14,199,991	14,200,000	9	0.0%
SUBORDINATE MWRA DEBT	92,032,292	92,032,293	1	0.0%
LOCAL WATER PIPELINE CP	4,750,396	2,540,172	(2,210,224)	-46.5%
CAPITAL LEASE	3,217,060	3,217,060	-	0.0%
DEBT PREPAYMENT	7,100,000	7,100,000	-	0.0%
VARIABLE DEBT	-	(7,243,421)	(7,243,421)	---
DEFEASANCE ACCOUNT	-	-	-	---
TOTAL DEBT SERVICE	**$ 482,369,358**	**$ 481,736,732**	**$ (632,626)**	**-0.1%**
TOTAL EXPENSES	**$ 767,943,713**	**$ 758,840,562**	**$ (9,103,152)**	**-1.2%**
REVENUE & INCOME				
RATE REVENUE	$ 739,042,200	$ 739,042,200	$ -	0.0%
OTHER USER CHARGES	9,328,768	9,346,469	17,701	0.2%
OTHER REVENUE	6,013,635	6,947,076	933,441	15.5%
RATE STABILIZATION	-	-	-	---
INVESTMENT INCOME	13,559,110	16,985,523	3,426,413	25.3%
TOTAL REVENUE & INCOME	**$ 767,943,713**	**$ 772,321,268**	**$ 4,377,555**	**0.6%**

Cost of Debt
4th Quarter – FY19

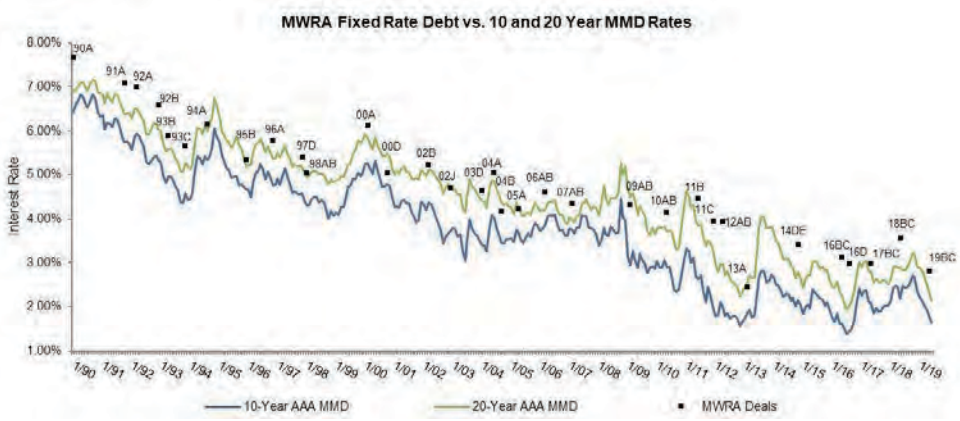
MWRA borrowing costs are a function of the fixed and variable tax exempt interest rate environment, the level of MWRA's variable interest rate exposure and the perceived creditworthiness of MWRA. Each of these factors has contributed to decreased MWRA borrowing costs since 1990.

Average Cost of MWRA Debt FYTD

Fixed Debt ($3.50 billion)	3.72%
Variable Debt ($418.9 million)	2.07%
SRF Debt ($979.9 million)	1.51%
Weighted Average Debt Cost ($4,899billion)	3.14%

Most Recent Senior Fixed Debt Issue
May 2019

2019 Series B &C ($144.2 million) 2.82 %

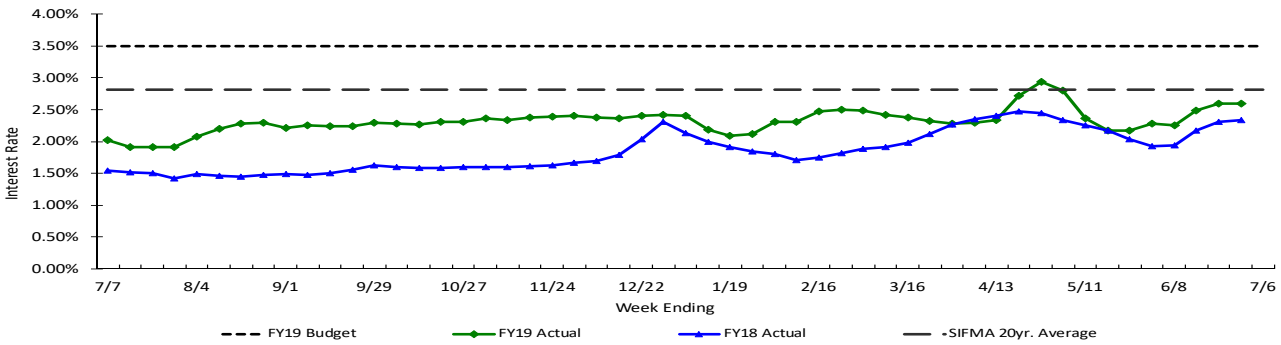


Bond Deal	1993C	1994A	1995B	1996A	1997D	1998AB	2000A	2000D	2002B	2002J	2003D	2004A	2004B	2005A
Rate	5.66%	6.15%	5.34%	5.78%	5.40%	5.04%	6.11%	5.03%	5.23%	4.71%	4.64%	5.05%	4.17%	4.22%
Avg Life	19.1 yrs	19.5 yrs	20.5 yrs	19.5 yrs	21.6 yrs	24.4 yrs	26.3 yrs	9.8 yrs	19.9 yrs	19.6 yrs	18.4 yrs	19.6 yrs	13.5 yrs	18.4 yrs

Bond Deal	2006AB	2007AB	2009AB	2010AB	2011B	2011C	2012AB	2013A	2014D-F	2016BC	2016D	2017BC	2018BC	2019BC
Rate	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%	2.82%
Avg Life	25.9 yrs	24.4 yrs	15.4 yrs	16.4 yrs	18.8 yrs	16.5 yrs	17.9 yrs	9.9 yrs	15.1 yrs	17.4 yrs	18.8yrs	11.2 yrs	11.7yrs	11.9yrs

Weekly Average Variable Interest Rates vs. Budget

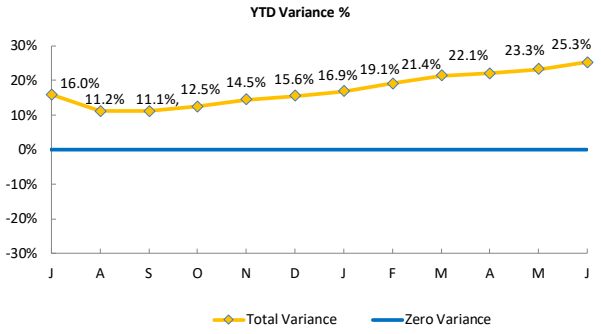
MWRA currently has eleven variable rate debt issues with $782.2 million outstanding, excluding commercial paper. Of the eleven outstanding series, four have portions, which have been swapped to fixed rate. Variable rate debt has been less expensive than fixed rate debt in recent years as short-term rates have remained lower than long-term rates on MWRA debt issues. In June, SIFMA rates ranged from a high of 1.90% to a low of 1.40% 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

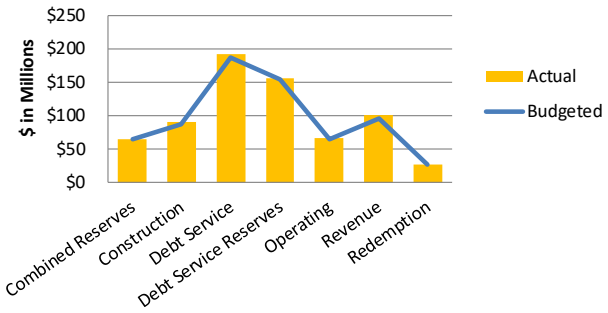
4th Quarter – FY19

Year To Date



	YTD BUDGET VARIANCE ($000)			
	BALANCES IMPACT	RATES IMPACT	TOTAL	%
Combined Reserves	$25	$10	34	2.4%
Construction	$50	$635	685	44.8%
Debt Service	$76	$1,404	1,481	45.2%
Debt Service Reserves	$7	$120	127	3.4%
Operating	$33	$225	258	21.3%
Revenue	$88	$750	837	50.2%
Redemption	$0	$4	4	0.6%
Total Variance	$279	$3,147	$3,426	25.3%

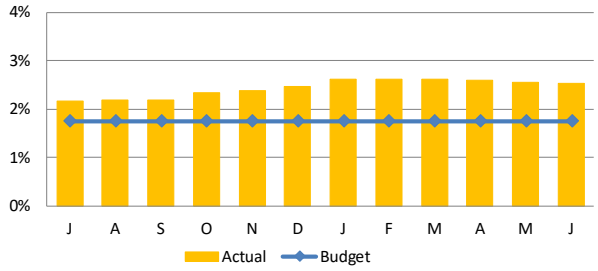
YTD Average Balances Budgeted vs. Actual



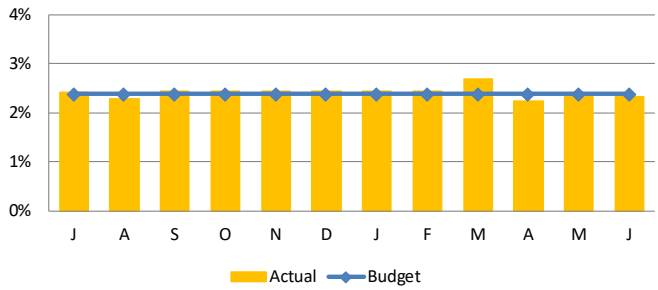
YTD Average Interest Rate Budgeted vs. Actual

Monthly

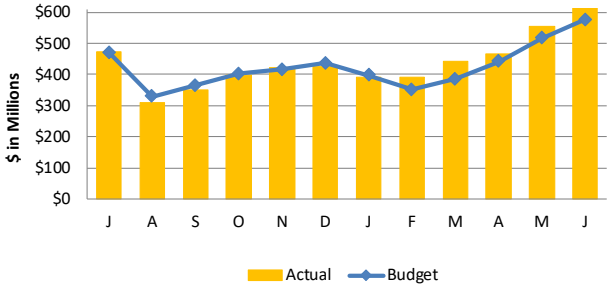
Short -Term Interest Rates



Long -Term Interest Rates



Short-Term Average Balances



Long-Term Average Balances