

MASSACHUSETTS WATER RESOURCES AUTHORITY

Board of Directors Report

on

Key Indicators of MWRA Performance

for

Second Quarter FY2020

Q1	Q2	Q3	Q4



Frederick A. Laskey, Executive Director
David Coppes, Chief Operating Officer
February 19, 2020

Board of Directors Report on Key Indicators of MWRA Performance

2nd Quarter FY20

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

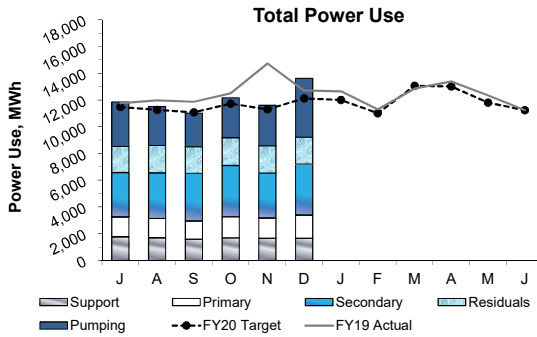
Frederick A. Laskey, Executive Director
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OPERATIONS AND MAINTENANCE

Deer Island Operations

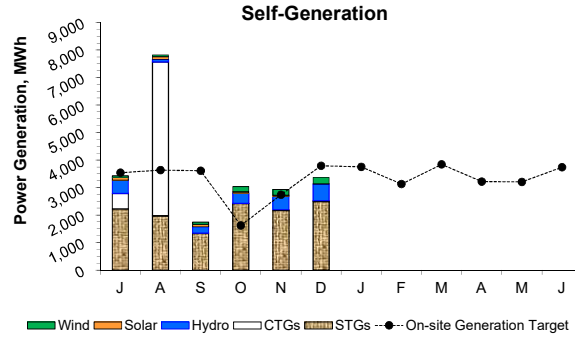
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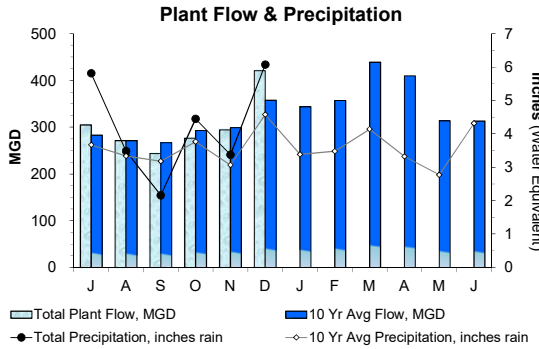


Total power usage in the 2nd Quarter was 6.4% above target as the Total Plant Flow was 15.7% above target with the 4 year average plant flow. As expected, power usage for raw wastewater pumping was above target by 13.6% due to the higher plant flow. Power usage for secondary treatment processes was 9.5% above target as a result of higher plant flow and also as both cold box systems were operated simultaneously for a portion of December to replenish the liquid oxygen consumed due to an equipment problem early in the month.

Note: Power usage projections are based on 4 year averages.

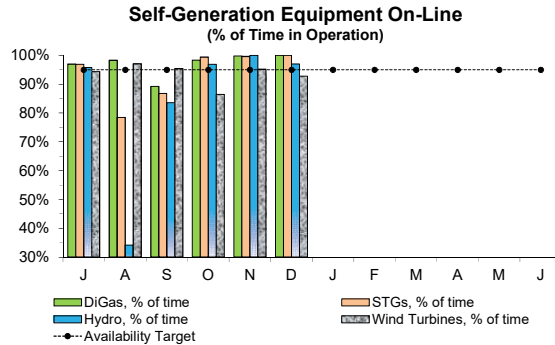


Power generated on-site during the 2nd Quarter was 14.4% above target. The CTGs were only operated for an ISO New England demand response winter audit test on December 4 and briefly throughout the quarter for maintenance/checkout purposes. As a result, CTG generation fell below target by 93.0% as CTG operation during storm events was not needed but was included in the budget projections. Power generation by the STGs was 31.6% above target as the target estimate included a Thermal Power Plant shutdown for maintenance which was completed earlier than expected during the 1st Quarter. Hydro Turbine generation was 28.5% above target as the repaired Hydro Turbine #1 was placed back in operation in October. Generation from the Solar Panels was 14.4% below target, while Wind Turbine generation was 9.1% above target.

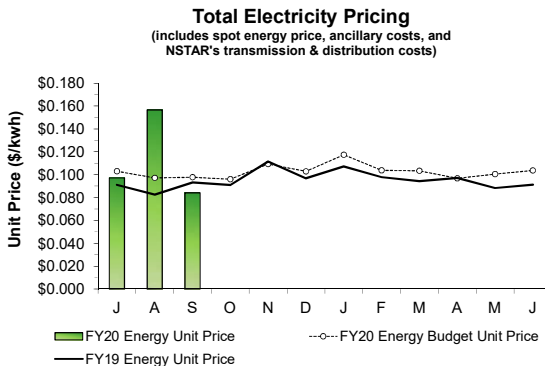


Total Plant Flow for the 2nd Quarter was 4.5% above target with the budgeted 10 year average plant flow (330.4 MGD actual vs. 316.3 MGD expected) as precipitation was 21.8% above target (13.89 inches actual vs. 11.40 inches expected). Total Plant Flow was 15.7% higher than the 4 year average plant flow used for energy budget projections.

Note: Plant Flow and precipitation projections are based on 10 year averages but are 4 year averages for the energy budget projections.

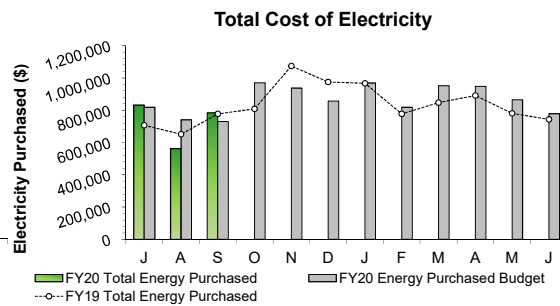


The DiGas system, STGs, and the Hydro Turbines met or exceeded the 95% availability target for the 2nd Quarter. The Wind Turbines fell below the 95% availability target following an issue with a control valve on the hydraulic pitch system on Turbine #2 in October and a low hydraulic lube oil issue that prevented Turbine #1 from operating for three (3) days in December.



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 September (the most current invoice available) was 13.9% below target with budgetary estimates. The actual total energy unit prices in October, November, and December are not yet available as the complete invoices have not been received. The Total Energy Unit Price includes a fixed block price, spot energy price, transmission & distribution charges, and ancillary charges.

Note: Only the actual energy prices are reported. Therefore, the dataset lags by three (3) months due to the timing of invoice receipt and review.



The Electricity cost data for Electricity Purchased in October, November, and December are not yet available. Year-to-date Total Cost of Electricity is \$109,982 (4.8%) lower than budgeted through September. While the Total Energy Unit Price was 13.4% higher than target, the Total Electricity Purchased was 6.8% lower than target due to the 19 day utility power cable outage in August to allow the utility to complete the final installation work for the new cross-harbor electrical cable.

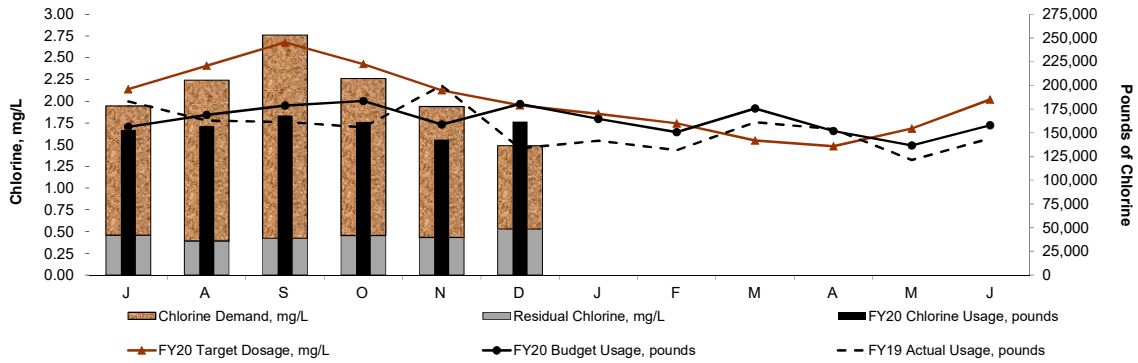
Note: Only months with complete Electricity Purchased data are reported. Therefore, the dataset lags by three (3) months due to the timing of invoice receipt and review.

Deer Island Operations

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Deer Island Sodium Hypochlorite Use



The disinfection dosing rate in the 2nd Quarter was 13.0% below target with budgetary estimates. Actual sodium hypochlorite usage in pounds of chlorine was also 10.8% 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 0.47 mg/L this quarter with an average dosing rate of 1.90 mg/L (as chlorine demand was 1.42 mg/L).

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	4	4	0	99.6%	10.26
A	2	2	0	99.3%	7.64
S	1	1	0	99.8%	2.45
O	3	3	0	99.0%	11.13
N	1	1	0	99.6%	4.81
D	2	2	0	99.4%	17.99
J					
F					
M					
A					
M					
J					
Total	13	13	0	99.4%	54.28

99.3% of all flows were treated at full secondary during the 2nd Quarter. There were six (6) secondary blending events due to high plant flow resulting from heavy rain and snow melt. These blending events resulted in a total of 33.93 hours of blending and 203.98 MGal of primary-only treated effluent with secondary effluent. The Maximum Secondary Capacity for the entire quarter was 700 MGD.

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

Deer Island Operations & Maintenance Report

Environmental/Pumping:

The plant achieved an instantaneous peak flow rate of 1,050.7 MGD mid-day on December 14. This peak flow occurred during a storm event that brought 1.35 inches of precipitation to the metropolitan Boston area. Plant flow was impacted by both rainfall from the storm event and by snow melt. Overall, Total Plant Flow in the 2nd Quarter was 4.5% above target with the 10 year average plant flow estimate for the quarter.

The lower motor bearings for North Main Pump Station (NMPS) raw wastewater pump #1 was replaced by a contractor in October. The pump was not available for operation from October 28 to November 1 to allow for the bearings replacement work. The contractor worked 12 hours a days to complete this task which had been anticipated to take 10 days to complete but was accomplished in less than five (5) days. The pump was immediately test operated on November 1 and remained in operation for the next seven (7) days without issue. This work did not impact pumping capacity as seven (7) pumps are required to maintain maximum pumping capacity at the NMPS and nine (9) pumps were available during this period.

Raw wastewater pump #9 at the NMPS was taken out of service on December 12 to allow a contractor to refurbish the pump and to recoat the pump's volute. The goal of this pump refurbishment is to return the pump to like-new condition and in so doing; increase energy efficiency, reliability, and extend the pump's useful life. The Eversource approved energy-efficiency incentive for this project is \$58,955 and is based on energy savings from the current state of the pump to the proposed increase in efficiency once the pump is refurbished. The pump refurbishment work was completed in December and the pump was returned to service in January under the direction of the manufacturer's representative.

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 NMPS. The upgrade for WTF Pump #5 began on June 10, 2019 and was completed by August 21. Performance testing of the upgraded Pump #5 and necessary tuning adjustments to the pump system continued through the remainder of December. Final acceptance is pending resolution of an ongoing vibration issue. To date, work has been completed on three (3) of the six (6) pumps (#6, #2, and #5), with Pump #5 pending final acceptance.

Deer Island Operations

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Deer Island Operations & Maintenance Report (continued)

Environmental/Pumping (continued):

The MWRA has an on-going project to inspect, and eventually rehabilitate, the shafts that transport wastewater between the remote headworks facilities and the DITP. In order to support the inspections, the remote headworks facilities will be shut down to allow inspectors to safely enter the shafts. DITP worked closely with Wastewater Operations staff during six (6) shutdowns of the remote headworks facilities in October and November to allow the contractor to perform inspections of Shaft C on Deer Island and the effluent channels at the Ward Street Headworks and the Columbus Park Headworks Facilities as part of this Remote Headworks and Deer Island Shafts Study project. The Columbus Park and Ward Street Headworks Facilities were isolated on six (6) separate occasions for approximately four (4) to (6) hours during each shutdown with each facility isolation starting at 1:00AM when the diurnal flows are at the lowest levels.

Secondary Treatment:

Annual turnaround maintenance was performed on Train #1 in the Cryogenic Oxygen Facility during the last two (2) weeks of October. This turnaround maintenance is performed on roughly half of the components and systems in the Cryogenic Oxygen Facility. During this turnaround maintenance, the contractor calibrated all the instrumentation on Cold Box unit #1 as well as, a number of other components of the oxygen plant. The same turnaround maintenance was completed on Train #2 in the spring (April).

Residuals Treatment:

The rehabilitation of Gravity Thickener #2 under the major Gravity Thickener Rehabilitation project was completed in October and Gravity Thickener #4 was turned over to the contractor to begin work on October 15 and is expected to be completed by February 2020. DITP has six (6) gravity thickeners used to concentrate sludge that is generated from the primary treatment process, and scum that is generated from all treatment processes. The sludge and scum thickening equipment and five (5) of the six (6) Fiberglass-Reinforced Plastic (FRP) domed covers have reached the end of their useful lives and are in need of replacement. 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). Additionally, critical components which were previously fabricated from carbon steel, including the center columns and center cages, will now be fabricated from type 316 stainless steel in order to provide superior protection against hydrogen sulfide gas which is present in high concentrations in this highly corrosive environment. The entire rehabilitation project is anticipated to take nearly three (3) years to complete. The rehabilitation of Gravity Thickeners #1 and #2 has been completed.

Odor Control:

Activated carbon in carbon adsorber (CAD) unit #4 and unit #5 in the East Odor Control (EOC) Facility was changed out in December as part of routine practice to replace spent carbon. Additionally, the activated carbon was removed from EOC CAD unit #3 and West Odor Control (WOC) Facility CAD unit #6 to allow for scheduled contractor work in the coming months to recoat the internal surface of these CAD units.

The Gravity Thickener (GT) airflow treatment portion of the Residuals Odor Control (ROC) Facility was taken offline on two (2) separate days for approximately four (4) to six (6) hours on December 17 and December 19 to allow a contractor to replace the dampers in the facility that serves Gravity Thickeners #4 and #6. These odor control dampers are being replaced as part of the Gravity Thickener Rehabilitation project. The dampers serving Gravity Thickeners #1, #2, #3, and #5 were replaced earlier in March and April 2019. Therefore, all six (6) gravity thickener dampers have now been replaced. Process air was contained within the building during both shutdowns and there were no resident odor complaints received as a result of these shutdowns.

Energy and Thermal Power Plant:

Overall, total power generated on-site accounted for 25.0% of Deer Island's total power use during Quarter 2. Renewable power generated on-site (by Solar, Wind, STGs, and Hydro Turbines) accounted for 24.8% of Deer Island's total electrical power use for the quarter.

Following annual maintenance in September, staff conducted combustion tuning on Deer Island's two (2) boilers in October. This tuning ensures that the boilers operate safely and efficiently while meeting all regulatory requirements. The tuning requires the boilers to be operated in several different modes (fuel oil combustion, digester gas combustion, and dual-fuel combustion). There were no impacts on the treatment plant's operation as one (1) boiler remained in operation at all times throughout the week of testing.

DITP experienced a boiler trip during the early morning of November 15 which was later determined to have been caused by a controller issue on the main steam turbine generator (STG). The boiler was reignited using fuel oil within 35 minutes after staff completed a check-out of the boiler and it was placed back on digester gas as the fuel source within 50 minutes of the boiler trip. Therefore, there was no significant heat loss to the heating loop. However, the main STG remained out of service until the afternoon of November 18 while staff and the service contractor continued with troubleshooting and the eventual replacement of the faulty controller unit with an older but properly functional unit. The back pressure steam turbine generator (BP-STG) was operated at maximum generation output (1.2 MW) during this time to minimize the impact to electricity generation.

DITP took delivery of 420,000 gallons of #2 fuel oil, a total of 42 oil tanker trucks, without incident from December 2 through December 11. This fuel oil is used for CTG operation, for boiler startup operations, and for supplemental fuel for boiler operation during periods of low or unstable digester gas production.

CTG-2B was operated for approximately two (2) hours on December 4 for an ISO-New England declared Demand Response winter audit event.

Clinton Treatment Plant Operations

Dewatering Building: Maintenance replaced bent skimmer arm on #2 gravity thickener. Staff washed down Gravity thickener #1.

Chemical Building: Maintenance staff continued to work on replacing #3 RAS pump. Operations staff cleaned soda ash mixing tank and removed approximately one yard of inorganic material or (old soda ash). Staff performed PM on Milton Roy, bisulfite, hypochlorite, and ferric chemical metering pumps. Staff also replaced the actuator on the #2 final clarifier influent 24 inch valve.

Aeration Basins: Staff also cleaned pH and DO probes

Phosphorus Building: Staff acid washed all three disk filters and also cleaned troughs and inspected all nozzles. Maintenance staff and FOD vactor truck vactored out two man holes. Also DOC contractor installed four shut off breakers for Hach instruments in building.

Headworks: Maintenance installed a shear pin in bucket elevator.

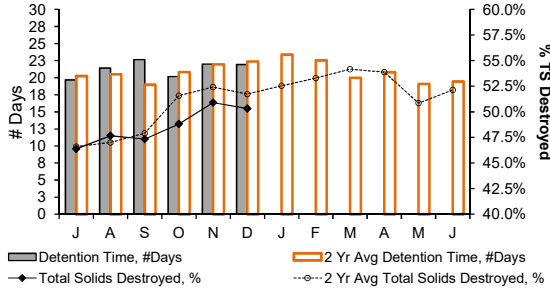
Digester Building: Contractor replaced two circulator pumps that were seized in the digester boiler room. Maintenance staff rebuilt two gas traps on digester gas line in lower digester building.

Deer Island Operations and Residuals

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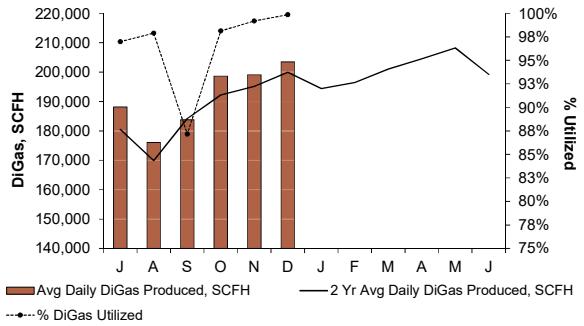
Sludge Detention Time in Digesters and Total Solids Destruction



Total solids (TS) destruction following anaerobic sludge digestion averaged 50.0% during the 2nd Quarter, 3.4% below target with the 3 year average of 51.9%. Sludge detention time in the digesters was 1.6% lower than target at 21.7 days as DI operated with an average of 8.0 digesters. The lower solids destruction and detention time is attributed to a 7.3% higher-than-expected total sludge production.

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

Digester Gas Production and % Utilized

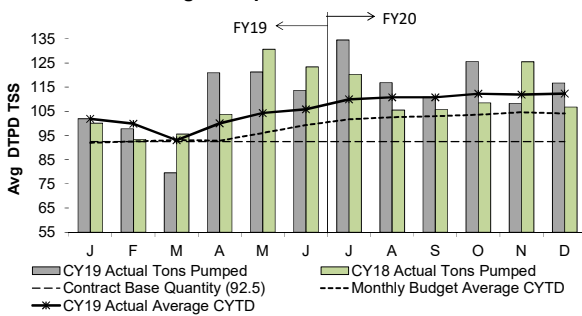


The Avg Daily DiGas Production in the 2nd Quarter was 2.4% above target with the 2 Year Avg Daily DiGas Production. On average, 99.1% of all the DiGas produced in the quarter was utilized at the Thermal Power Plant (TPP).

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).

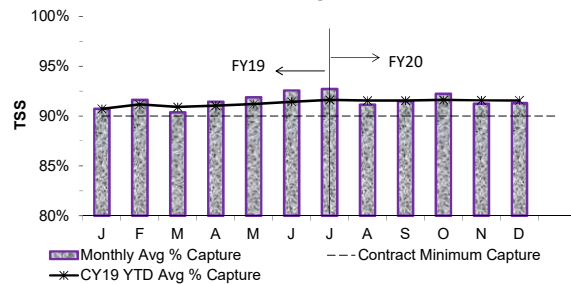
Sludge Pumped From Deer Island



The average quantity of sludge pumped to the Biosolids Processing Facility (BPF) in the 2nd Quarter was 116.8 TSS Dry Tons Per Day (DTPD) - 8.9% above target with the FY20 budget of 107.3 TSS DTPD for the same period. Sludge delivered to the BPF was higher than expected during the quarter mainly due to higher-than-expected primary and secondary sludge production, in addition to inventory shifts in the digested sludge holding tanks on DITP.

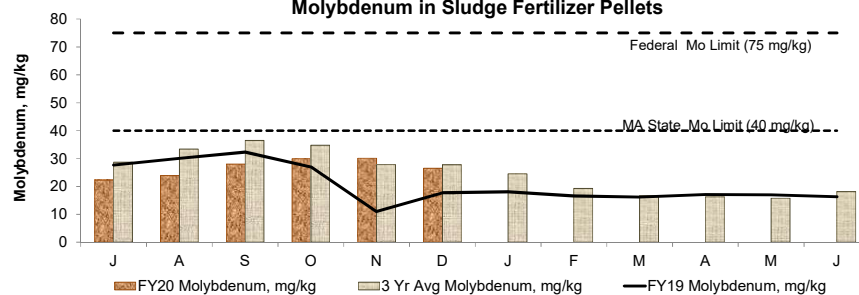
The CY19 average quantity of sludge pumped is 112.3 DTPD - 7.9% above target with the CY19 average budget of 104.1 DTPD for the same time period.

Monthly Average % Capture of Processed Sludge



The contract requires NEFCO to capture at least 90.0% of the solids delivered to the Biosolids Processing Facility. The average capture for the 2nd Quarter was 91.6% and the CY19 average capture was also 91.6%.

Molybdenum in Sludge Fertilizer Pellets



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

The levels have been below the DEP Type 1 limit for all three (3) metals. For Mo, the level in the MWRA sludge fertilizer pellets during the 2nd Quarter averaged 28.8 mg/kg, 4% below the 3 year average, 28% below the MA State Limit, and 62% below the Federal Limit.

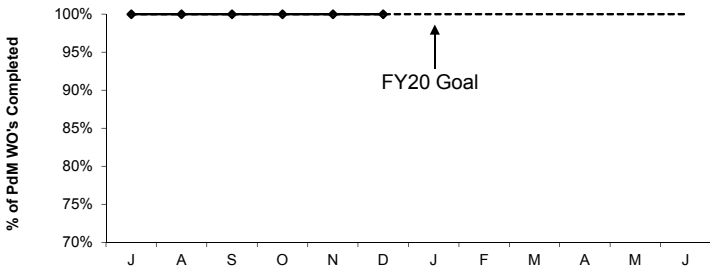
Deer Island Maintenance

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Productivity Initiatives

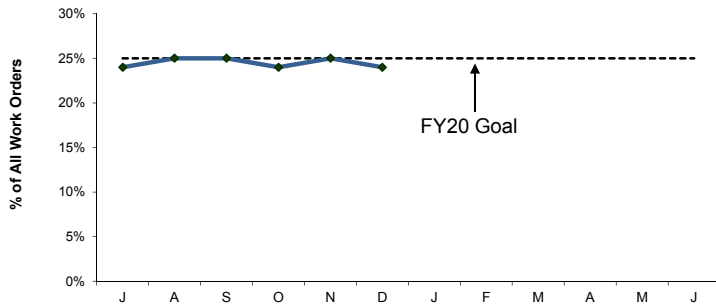
Productivity initiatives include increasing predictive maintenance compliance and increasing PdM work orders. Accomplishing these initiatives should result in a decrease in overall maintenance backlog.

Predictive Maintenance Compliance



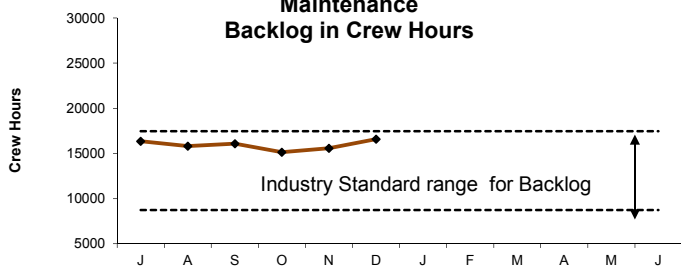
Deer Island's FY20 predictive maintenance goal is 100%. DITP completed 100% of all PdM work orders this quarter. DITP is continuing with an aggressive predictive maintenance program.

Predictive Maintenance



Deer Island's increased FY20 predictive maintenance goal is 25% of all work orders to be predictive. 24% of all work orders were predictive maintenance this quarter. The industry is moving toward increasing predictive maintenance work to reduce downtime and better predict when repairs are needed.

Maintenance Backlog in Crew Hours

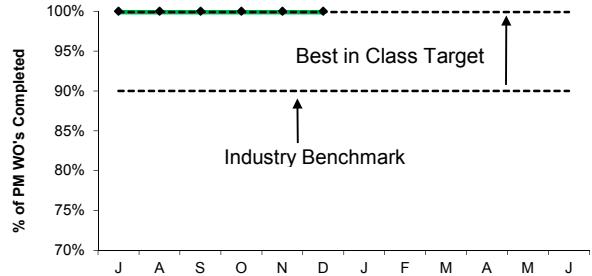


DITP's maintenance backlog at Deer Island is 16,581 hours this quarter. DITP is at the upper end of the industry average for backlog. The industry Standard for maintenance backlog with 97 staff (currently planned staffing levels) is between 8,730 hours and 17,460 hours. Backlog is affected by the following vacancies; (3) Electricians and (1) Instrument Technician. Management continues to monitor backlog and to ensure all critical systems and equipment are available.

Proactive Initiatives

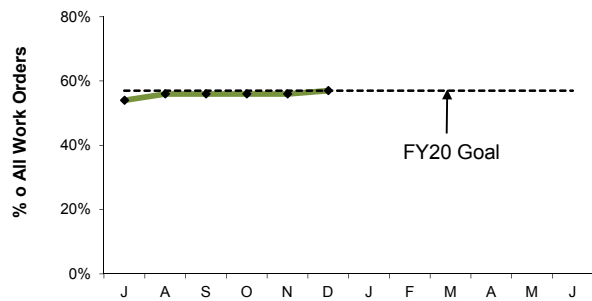
Proactive initiatives include completing 100% of all preventative maintenance tasks and increasing preventative maintenance kitting. These tasks should result in lower maintenance costs.

Preventative Maintenance Compliance



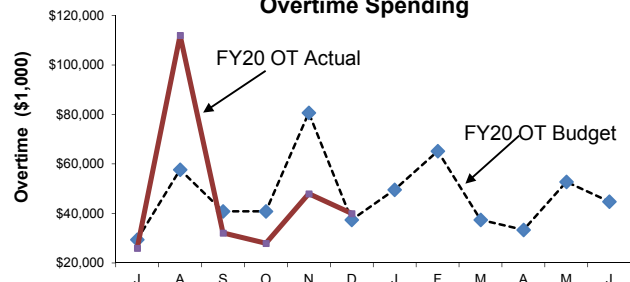
Deer Island's FY20 preventative maintenance goal is 100% completion of all work orders from Operations and Maintenance. DITP completed 100% of all PM work orders this quarter.

Maintenance Kitting



Deer Island's increased FY20 maintenance kitting goal is 57% of all work orders to be kitted. 56% of all work orders were kitted this quarter. Kitting is staging of parts or material necessary to complete maintenance work. This has resulted in more wrench time and increased productivity.

Overtime Spending



Maintenance overtime was under budget by \$44k this quarter and is \$25k under for the FY20. Management continues to monitor backlog and to ensure all critical equipment and systems are available. This quarter's overtime was predominately used for Storm Coverage/High Flows, South Main Pump Station Elevated Flow, North Main Pump Station #1 Motor Installation, Thermal Power Plant Steam Turbine Startup Support, Cryo Mole Sieve #2 Heater Coil Replacement and Fabrication of Disinfection Actuator Bases.

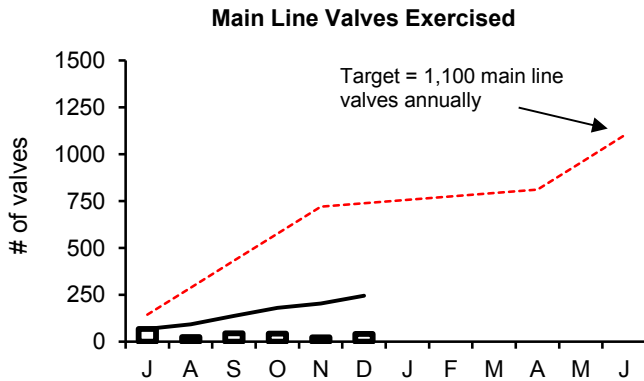
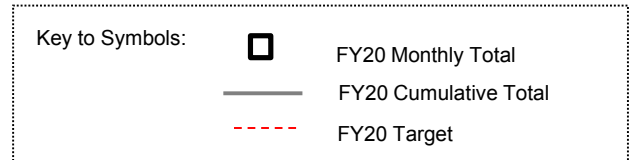
Water Distribution System Valves

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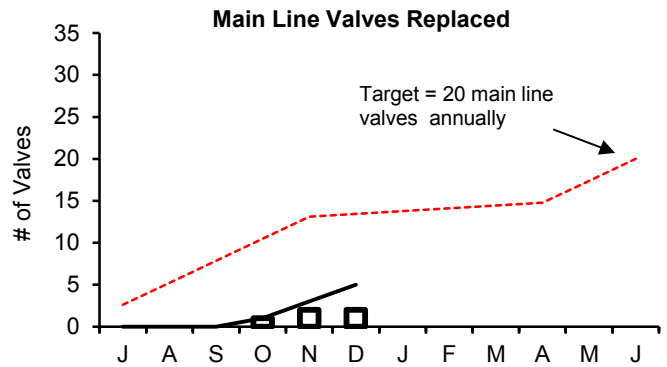
Background

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.

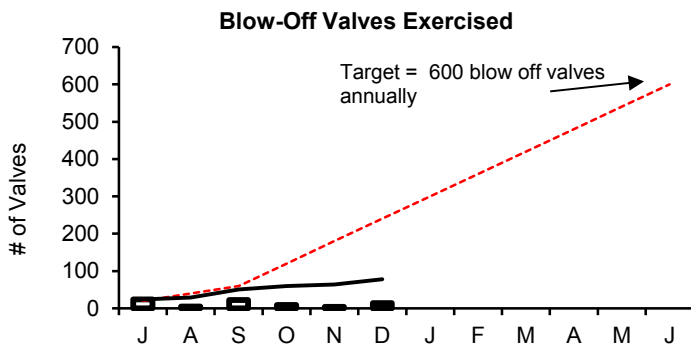
Type of Valve	Inventory #	Operable Percentage	
		FY20 to Date	FY20 Targets
Main Line Valves	2,159	96.7%	95%
Blow-Off Valves	1,317	98.6%	95%
Air Release Valves	1,380	95.1%	95%
Control Valves	49	100.0%	95%



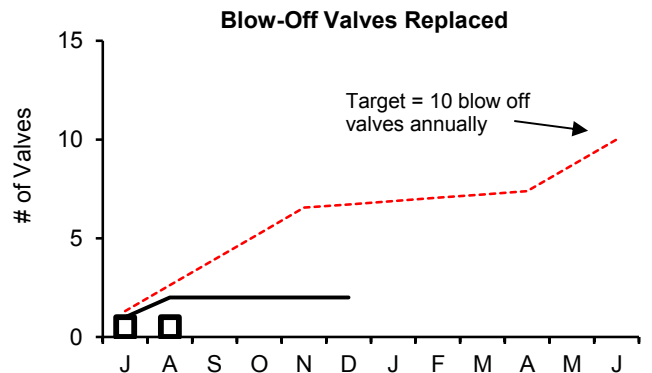
During the 2nd Quarter of FY20, 108 main line valves were exercised. Below target due to staffing shortage and high priority CIP projects; Section 110 and WASM 1. The total exercised for the fiscal year to date is 245.



During the 2nd Quarter of FY20, there were five main line valves replaced. Below target due to isolation and permit issues. The total replaced for the fiscal year to date is five.



During the 2nd Quarter of FY20, 27 blow off valves were exercised. Below target due to staffing shortage and high priority CIP projects; Section 110 and WASM 1. The total exercised for the fiscal year to date is 78.

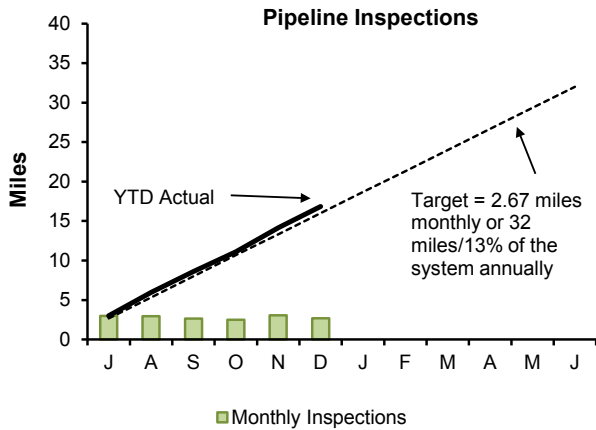


During the 2nd Quarter of FY20, there were no blow off valves replaced. Below target due to isolation and permit issues. The total replaced for the fiscal year to date is two.

Wastewater Pipeline and Structure Inspections and Maintenance

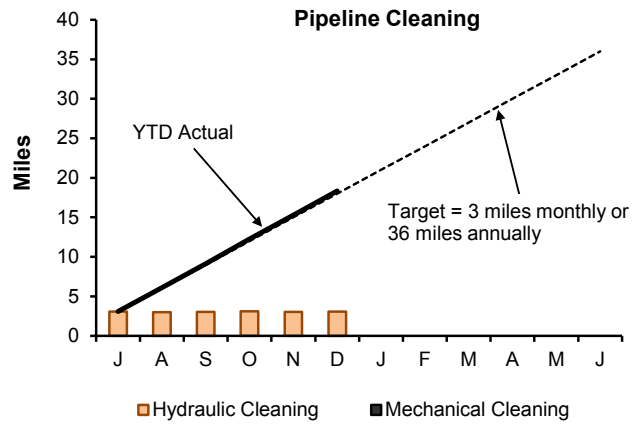
2nd Quarter - FY 20

Inspections



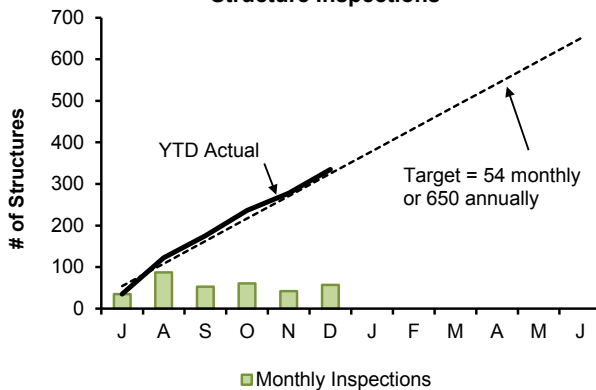
Staff internally inspected 8.23 miles of MWRA sewer pipeline during this quarter. The year to date total is 16.84 miles. No Community Assistance was provided quarter.

Maintenance



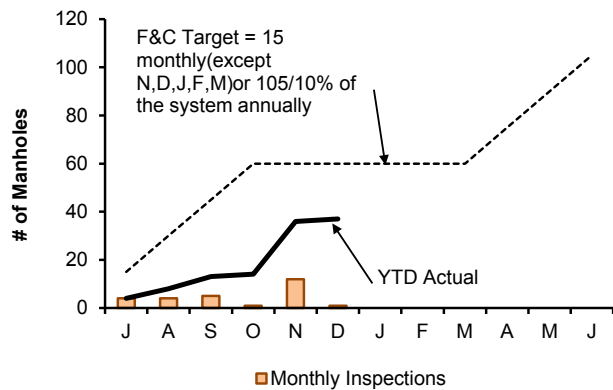
Staff cleaned 9.21 miles of MWRA's sewer system and removed 31 yards of grit and debris during this quarter. The year to date total is 18.34 miles. No Community Assistance was provided this quarter.

Structure Inspections



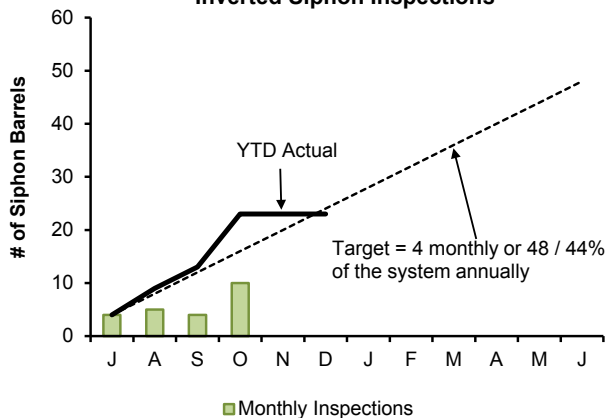
Staff inspected the 36 CSO structures and performed 124 additional manhole/structure inspections during this quarter. The year to date total is 335 inspections.

Manhole Rehabilitation



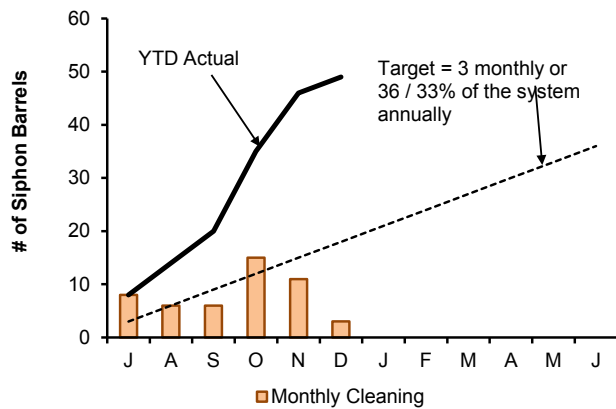
Staff replaced 14 frames & covers during this quarter. The year to date total is 37. Staff have been working the DITP Shaft Project shutdowns.

Inverted Siphon Inspections



Staff inspected 10 siphon barrels this quarter. Year to date total is 23 inspections.

Inverted Siphon Cleaning

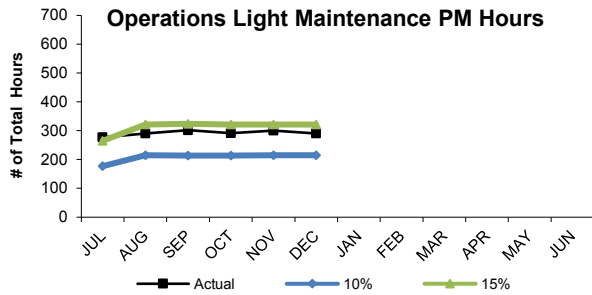


Staff cleaned 29 siphon barrels during this quarter. Year to date total is 49.

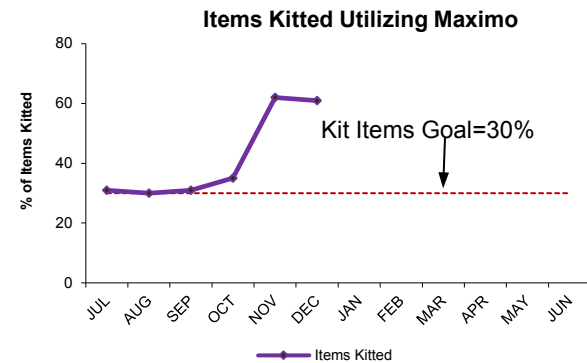
Field Operations' Metropolitan Equipment & Facility Maintenance

2nd Quarter - FY20

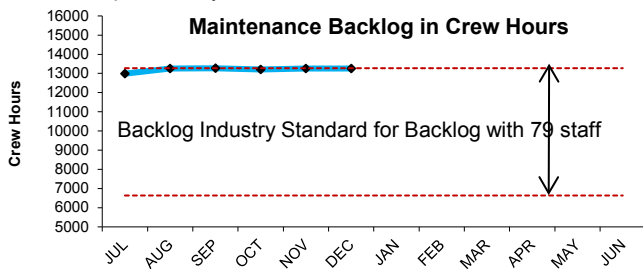
Several maintenance and productivity initiatives are in progress. The goal for the Overall PM completion and the Operator PM completion was raised to 100% for Fiscal Year 2010. The Operator PM and kitting initiatives frees up maintenance staff to perform corrective maintenance and project work, thus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



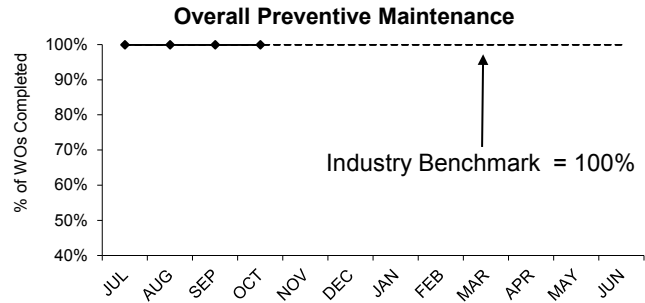
Operations staff averaged 294 hours of preventive maintenance during the 2nd Quarter, an average of 14% of the total PM hours for the 2nd Quarter, which is within the industry benchmark of 10% to 15%.



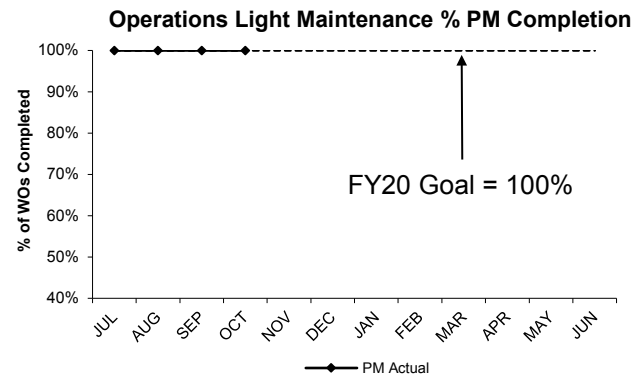
Operation's FY20 maintenance kitting goal has been set at 30% of all work orders to be kitted. Kitting is the staging of parts or material necessary to complete maintenance work. In the 2nd Quarter, 53% of all applicable work orders were kitted. This resulted in more wrench time and increased productivity.



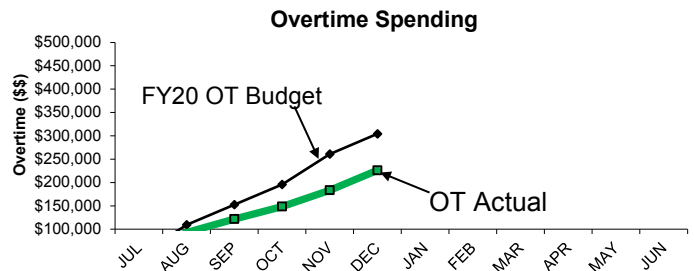
The 2nd Quarter backlog average is 13241 hours. Management's goal is to continue to control overtime and still stay within the industry benchmark of 6636 to 13275 hours.



The Field Operations Department (FOD) preventive maintenance goal for FY20 is 100% of all PM work orders. Staff completed an average of 100% of all PM work orders in the 2nd Quarter.



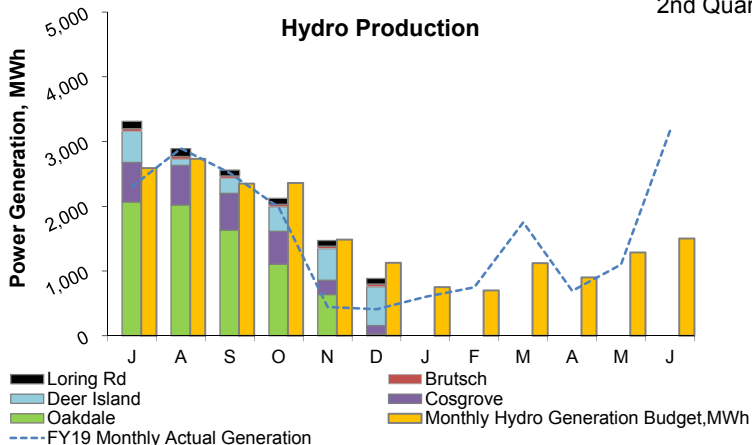
Wastewater Operators complete light maintenance PM's which frees up maintenance staff to perform corrective maintenance. Operations' FY20 PM goal is completion of 100% of all PM work orders assigned. Operations completed an average of 100% of PM work orders in the 2nd Quarter.



Maintenance overtime was \$47k under budget for the 2nd Quarter. Overtime was used for critical maintenance repairs and wet weather events. Overtime for FY20 is \$226k which is currently \$78k under budget for the fiscal year.

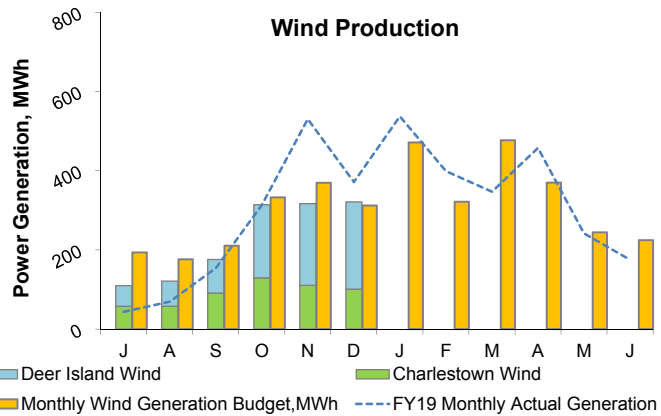
Renewable Electricity Generation: Savings and Revenue

2nd Quarter - FY20



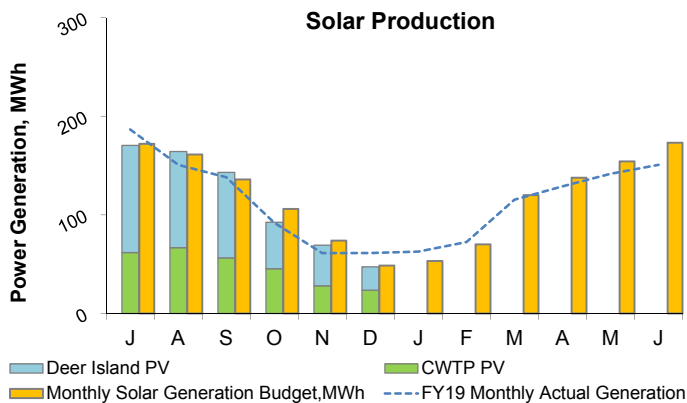
In the 2nd Quarter of FY20, the renewable energy produced from all hydro turbines totaled 4,479 MWh; 10% below budget³. Quabbin transfers stopped on 12/2/2019. The total energy produced to-date in FY20 is 13,242 MWh; 5% above budget³.

The total savings and revenue² to date in FY20 (actuals through September¹) is \$308,313; 14% above budget³. The savings and revenue value does not include RPS REC revenue (see next page).



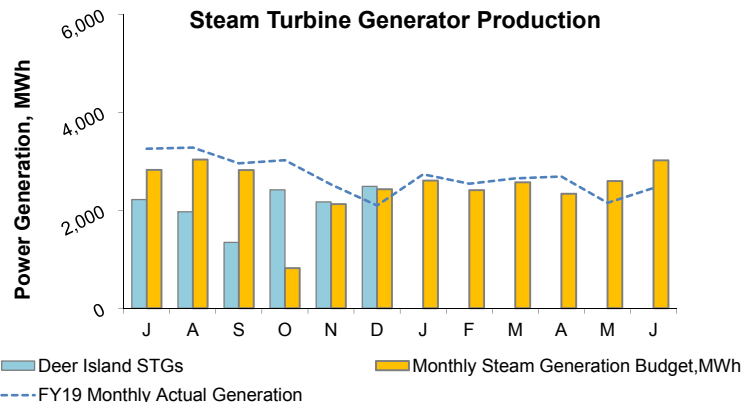
In the 2nd Quarter of FY20, the renewable energy produced from all wind turbines totaled 952 MWh; 6% below budget³. The total energy produced to-date in FY20 is 1,358 MWh; 15% above budget³.

The total savings and revenue² to date in FY20 (actuals through September¹) is \$68,094; 25% below budget³. The savings and revenue value does not include RPS REC revenue (see next page).



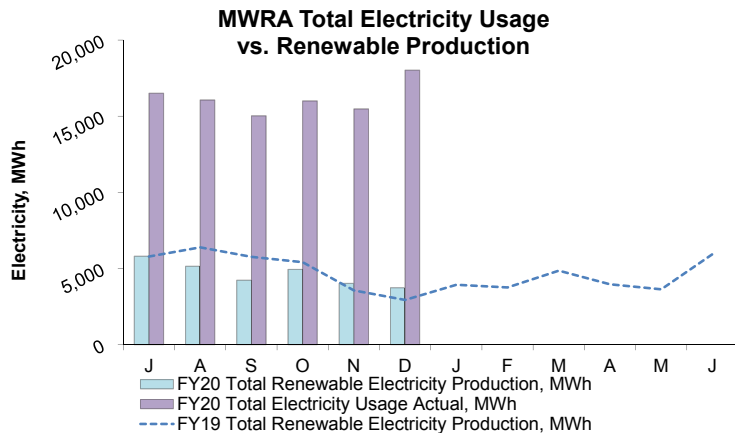
In the 2nd Quarter of FY20, the renewable energy produced from all solar PV systems totaled 209 MWh; 8% below budget³. The total energy produced to-date in FY20 is 697 MWh; equal to budget³.

The total savings and revenue² to date in FY20 (actuals through September¹) is \$152,894; 151% above budget³. The savings and revenue value does not include RPS REC revenue (see next page).



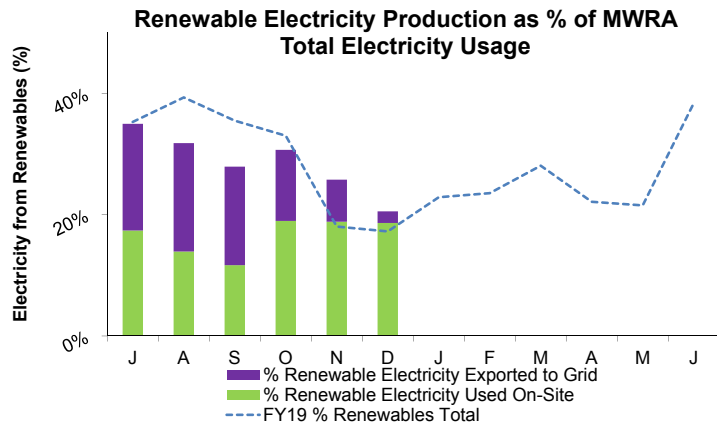
In the 2nd Quarter of FY20, the renewable energy produced from all steam turbine generators totaled 7,072 MWh; 32% above budget³. The total energy produced to-date in FY20 is 12,601 MWh; 10% below budget³.

The total savings and revenue² to date in FY20 (actuals through September¹) is \$636,796; 26% below budget³. The savings and revenue value does not include RPS REC revenue (see next page).



In the first half of FY20, MWRA's electricity generation by renewable resources totaled 27,898 MWh. MWRA's total electricity usage was approximately 97,103 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.

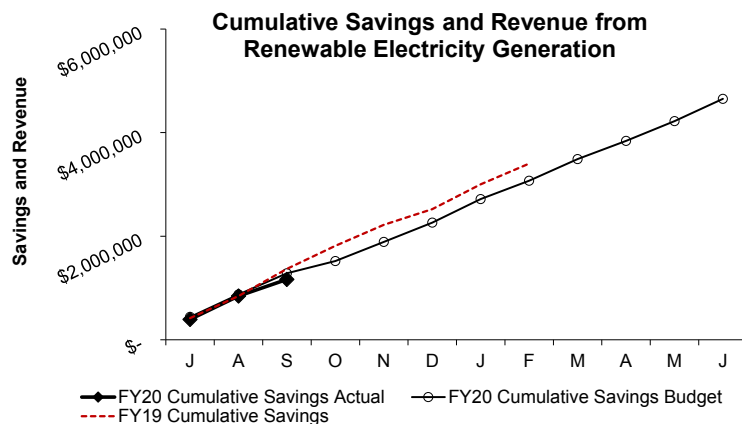
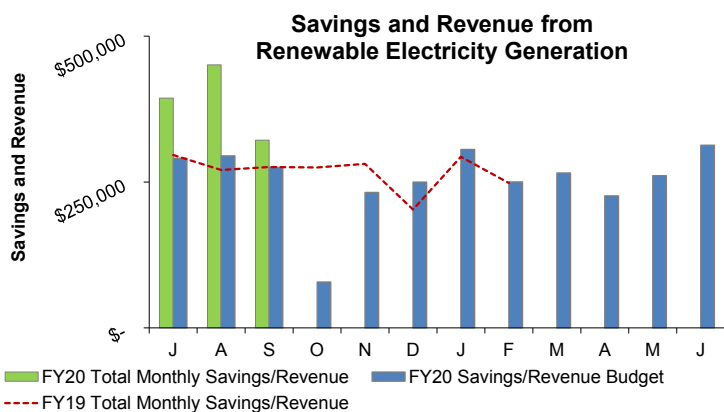
In the first half of FY20, green power generation represented approximately 29% of total electricity usage. All renewable electricity generated on DI is used on-site (this accounts for more than 50% of MWRA renewable generation). Almost all renewable electricity generated off-DI is exported to the grid.



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

Renewable Electricity Generation: Savings and Revenue

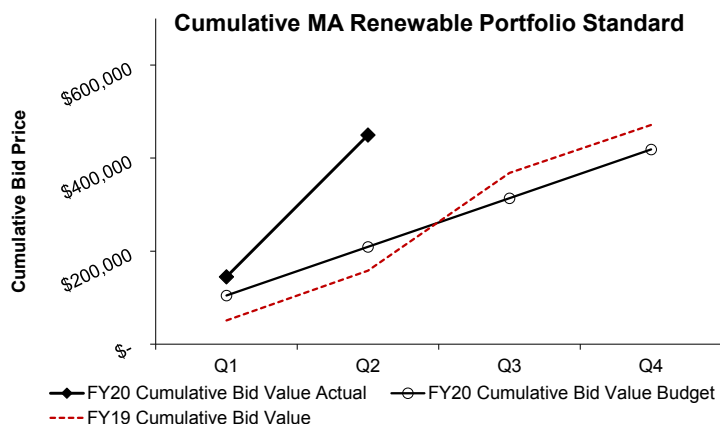
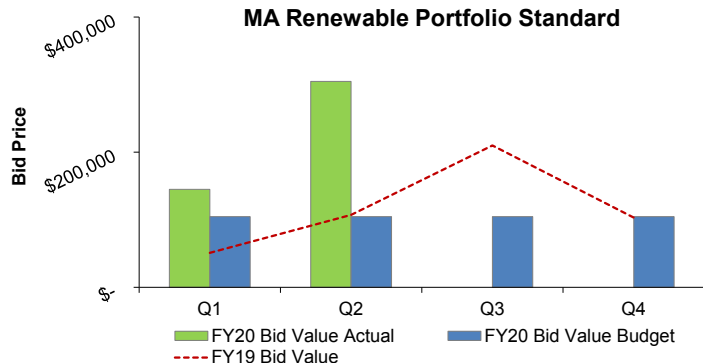
2nd Quarter - FY20



Savings and revenue from MWRA renewable electricity generation in the first 3 months of FY20 (actuals only through September¹) is \$1,166,098; which is 9% below the budget³.

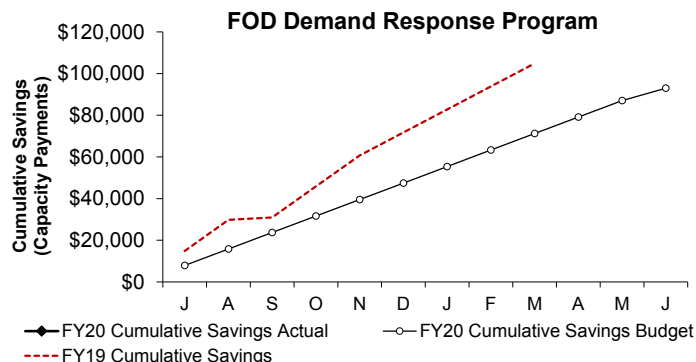
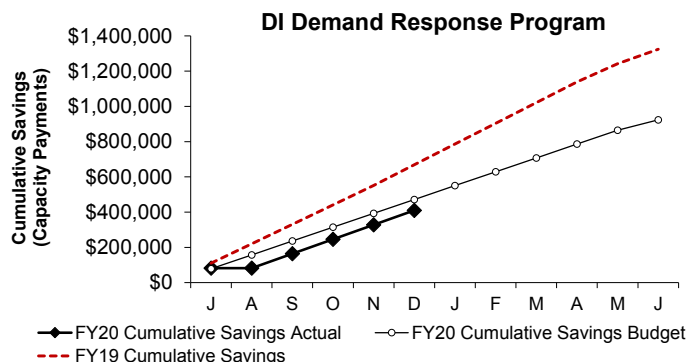
Savings and revenue² from all renewable energy sources include wind turbines, hydroelectric generators, solar panels, and steam turbines (DI). This includes savings and revenue due to electricity generation (does not include avoided fuel costs and RPS RECs).

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



Bids were awarded during the 2nd Quarter¹ from MWRA's renewable energy assets; 5,590 Q2 CY2019 Class I Renewable Energy Certificates (RECs), 3,689 Q2 CY2019 Class II RECs, and 92 Q2 CY2019 Solar RECs were sold for a total value of \$304,820 RPS revenue; which is 191% above budget³ for the Quarter. This is mostly due to Class I REC prices being over 200% above the budget for the quarter.

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

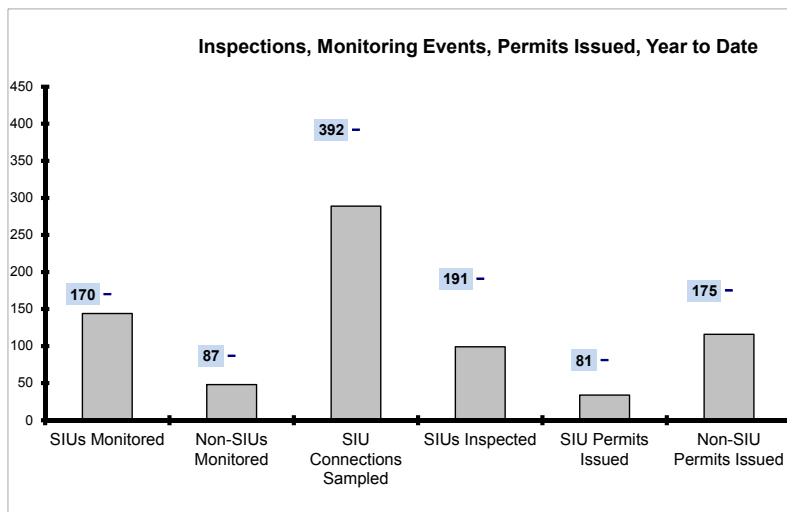


Currently Deer Island, JCWTP, and Loring Rd participate in the ISO-New England Demand Response Programs⁴. By agreeing to reduce demand and operate the facility generators to help reduce the ISO New England grid demand during periods of high energy demand, MWRA receives monthly Capacity Payments from ISO-NE. When MWRA operates the generators during an ISO-NE called event, MWRA also receives energy payments from ISO-NE. FY20 Cumulative savings (Capacity Payments only) through December¹ total \$409,931 for DI and payments for FOD have not yet been received for this reporting period¹.

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

Toxic Reduction and Control

2nd Quarter - FY20



EPA Required SIU Monitoring Events for FY20: 170
YTD: **144**

Required Non-SIU Monitoring Events for FY20: 87
YTD: **48**

SIU Connections to be Sampled For FY20: 392
YTD: **289**

EPA Required SIU Inspections for FY20: 191
YTD: **99**

SIU Permits due to Expire In FY20: 81
YTD: **34**

Non-SIU Permits due to Expire for FY20: 175
YTD: **116**

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.

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						Permits Issued	
	0 to 120		121 to 180		181 or more		SIU	Non-SIU
	SIU	Non-SIU	SIU	Non-SIU	SIU	Non-SIU		
Jul	2	19	0	0	0	0	2	19
Aug	4	21	0	4	1	0	5	25
Sep	7	16	0	0	0	0	7	16
Oct	6	19	0	1	0	1	6	21
Nov	5	17	0	2	0	0	5	19
Dec	9	12	0	3	0	1	9	16
Jan								
Feb								
Mar								
Apr								
May								
Jun								

% YTD	97%	90%	0%	9%	3%	2%	34	116
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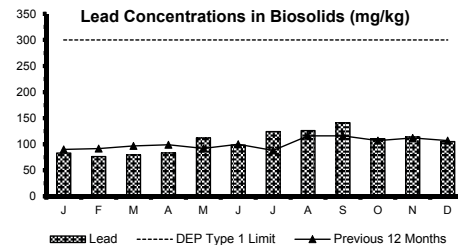
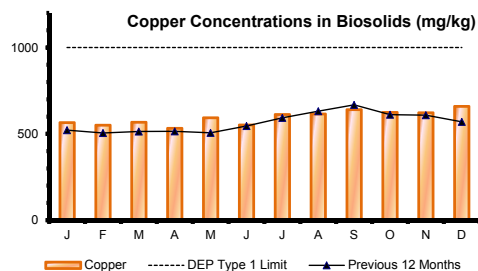
EPA requires MWRA to issue or renew 90% of SIU permits within 120 days of receipt of the application or the permit expiration date - whichever is later. EPA also requires the remaining 10% of SIU permits to be issued within 180 days.

The MWRA fiscal year is at the halfway mark.

In the 2nd quarter of FY20, seventy-six permits were issued, twenty of which were SIUs. All the SIU permits were issued within the 120-day timeframe. There is 97% compliance in the issuing of SIU permits so far.

In this quarter, eight of the non-SIU permits were issued after the 120-day timeframe. Timely availability of much needed data for permit processing coupled with the late payment of the permit fees, led to those eight permits being issued beyond the 120-day timeframe.

For the Clinton Sewer Service area, no SIU permit was issued in this quarter and none so far in the fiscal year.



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.

December 2019 saw a slight rise in copper but overall, 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

2nd Quarter – FY20

Western Water Operations and Maintenance

Carroll Water Treatment Plant: Staff supported replacement of one of the emergency generators. Staff completed annual B-side half plant shutdown, maintenance, and cleaning activities. Grounds and facility staff constructed an outdoor stairway to provide winter access to the sampling location for NPDES discharge sampling during half plant operations.

Chicopee Valley Aqueduct: Staff completed the annual Sanitary Survey of the system with the Department of Environmental Protection.

Metro Water Operations and Maintenance

Lynnfield Pump Station: Staff deployed and set up a Mobile Pump Unit at Lynnfield's Pump Station to support the town's rehabilitation project. The MPU will be the town's standby pump until construction is complete.

Water Pipeline Program: Work was completed on the drainage and road repairs on "10% Road" at the Wachusett Dam, including repairing the existing drains and catch basins, restoring and upgrading the drainage swale, and re-grading the road. Staff installed a 20-inch valve in Newton's main near Commonwealth Ave Pump Station to support ongoing construction. Seven leaks were repaired including the service line feeding Alewife Brook Pumping Station. Leak detection was performed on over 20 miles of MWRA water main and assistance was provided to twelve customer communities.

Operations Engineering

Staff coordinated several meetings with the SEH communities to create a written water supply contingency plan in the event Section 77 has to be isolated, and trained MWRA staff on the Section 89/110 emergency action plan. Staff continued to participate in the Risk and Resilience Assessments under AWIA. Staff assisted Framingham with their potential *E. coli* event, and reading with their Boil Order.

Wastewater Operations & Maintenance

Remote Headworks Upgrades: Operations staff attended biweekly construction coordination meetings with Construction & Engineering staff, the contractor and the consultants, as well as internal weekly update meetings. Channels #1 and #2 have been rehabilitated and turned back over to Operations. Channel #3 was turned over to contractor for rehabilitation on 12/3/19. Staff attended internal meetings regarding the channel #1 grit collection chain failure. Towable Generator Docking Stations: Operations staff continue to work with Construction staff, assisting with required utility power outages to install new electrical equipment at New Neponset, Framingham and Caruso Pump Stations.

Remote Headworks & Deer Island Shafts Study: Operations supported this project multiple times during Q2 as flow was stopped at the Ward Street and Columbus Park Headworks for the internal inspection of shaft "C" at Deer Island.

Wastewater OCC Improvements Project: Operations staff met with construction and SCADA staff several times during the second quarter of FY20 to review plans for the new Wastewater OCC console.

- Carbon Replacement at Braintree Weymouth PS and Hough's Neck PS: Operations staff provided operational support for the replacement of the carbon in the odor control system at both facilities on 10/4/19.

- Remote OCC: Operations staff conducted remote operation of the Wastewater OCC from the Carroll Water Treatment Plant on 12/23/19.

Metering

- Community Outreach: Chelsea will be taking water and wastewater system operations back in-house after years of contracting most operations. In anticipation of this change, Chelsea personnel reached out to MWRA to gain a better understanding of all revenue data collection and calibration efforts. Staff provided calibration data from all Chelsea water and wastewater meters and Chelsea staff observed field calibration activities at wastewater meter CH-8C and water meter 102. We will continue to meet with Chelsea personnel as they gear up to assume control of their water and wastewater operations in July of 2020.

Metering Staff reached out to the following 12 communities to indicate higher than average flows observed in their monthly water meter flow reports; Everett, Lynnfield, Marblehead, Medford, Melrose, Malden, Milton, Nahant (x2), Norwood, Southborough (x2), Swampscott, and Arlington. In several cases the demand increases seemed to be related to a later than average shift from warm to cold weather flows. These flows were back to normal by mid-October, however staff will continue to follow up with these communities.

Staff identified an open division gate in Boston near meter #94. This was causing an increase in demand in the Southern High Zone. Metering worked with BWSC engineers to identify the location of the open gate and their valve was closed on October 15.

Through a collaborative effort with valve operations crew, the fire flow bypass valve for meter #91 in Somerville was placed back into service. The fire flow bypass valve for this meter had been left open since late 2018 in order to ensure fire flow capacity in the Somerville Low service area. Somerville low service flow thus needed to be estimated to account for backflow out of the Somerville system into MWRA's. The bypass valve and venturi meter are back in operation as of December 17, 2019 with no further estimation expected.

Verizon 4G Upgrade: Metering staff had been preparing for Verizon to shut off their 3G data network permanently on January 1, 2020 but Verizon notified the MWRA in September that the shutdown of the 3G network has been delayed to January 1, 2021. In order to maintain communications after the shutoff a total of 182 Telog RU-33 wastewater dataloggers and 316 3G modems (166 at Water meter sites and 150 at W and WW Facilities) required upgrade. Rollout of all modems and RU-35s is anticipated in the first quarter of 2020 well before the Verizon 3G shutoff.

- Prison Point Tide Gate Replacement Project: Operations staff continue to work with engineering staff on the replacement of the Prison Point tide gate.

Field Operations Highlights

2nd Quarter – FY20

	4G Modems, Water Meters	4G Modems, at Facilities	Telog RU-35s, at WW Meters
Installed as of 9/30/19	162	20	56
Installed in Q2 FY20	4	36	59
Total Installed	166	56	115
Remaining	0	94	67

Staff provided water quality updates, reviewed Wachusett Reservoir buoy data, and monitored water quality complaints.

Regulatory and Non-Regulatory Sampling Programs: Staff provided assistance to various communities:

- Newton: a water quality evaluation of their Newton Covered Storage Tank.
- Lynnfield Water District #1: sampling throughout town in response to low chlorine residuals, coliform detections, and elevated nitrate-nitrite.
 - Wakefield: water quality evaluation of their Sydney Street tank.
- Weston and Waltham: customer water quality complaints.
- Framingham: a water quality evaluation of their Doeskin and Beebe tanks; assistance and planning associated with a potential Boil Water Order.
- Reading: Boil Water Order in early November; Revised Total Coliform Rule Level 2 Assessment
- CVA Communities (S. Hadley FD #1, Chicopee) & Westover Air Reserve Base: reports and memorandums on Q3 disinfection byproduct levels.
- Milton, Somerville, MWRA samplers: Coliform Rule sampler training
- Canton, Chicopee, Needham, Peabody, Wakefield, Wellesley, and Woburn: two sampler-training sessions for UCMR4 sampling.

TRAC

Inspections and Permitting

TRAC issued 59 MWRA 8(m) Permits for work within water infrastructure easements and 42 permits for work within sewer infrastructure easements. Permits were issued in an average of 68 days from the date the application was received.

TRAC monitored the septage receiving sites a total of 30 times. Staff conducted 189 inspections of existing gasoline/oil separators, and 34 new construction gasoline/oil separators.

Monitoring

In addition to 282 SIU and 45 NSIU monitoring events, TRAC completed 511 other sampling events including Local Limits, Municipal, Clinton NPDES, Clinton Landfill, Clinton Wastewater Treatment Plant monitoring well, Sulfide Project, Cosgrove and Oakdale NPDES, Carroll Water Treatment Plant Halfplant Maintenance and Compliance sampling for discharge to Marlborough, CSO Hypochlorite Tank chemical testing, Sudbury Aqueduct monitoring, Mystic and Alewife Project CSO and Stormwater and Emergency Response.

- **On October 2, 2019**, Columbus Park Headworks reported diesel odors. TRAC staff responded, detecting low levels of organic vapors. Deer Island later reported slight diesel odors in the grit chamber. TRAC staff monitored upstream lines, but did not detect any organic vapors in the influent.
- **On October 29, 2019**, TRAC responded to a reported fuel leak in a private residence in Weymouth. It appears approximately 50-100 gallons of fuel oil were released to the floor. Monitoring by TRAC staff indicated that it did not appear it reach the sewer.
- **On December 4, 2019**, TRAC staff noticed the influent turn red at the Clinton Treatment Plant just after NPDES sampling. Staff collected samples of the flow for analysis. The Clinton Wastewater Plant staff were able to divert the flow to two offline reactor tanks and held the wastewater while analyses were performed. TRAC staff visited all industries in town looking for the source of the red flow, but were unable to locate the source. Analysis did not find any pollutants of concern and the flow was bled through the treatment system without further incident.

Environmental Quality-Water

Algae: Elevated levels of *Chryso-sphaerella* and chlorophyll-a on Wachusett and Quabbin Reservoirs required enhanced algae monitoring by MWRA and DCR from August through October.

Environmental Quality-Wastewater

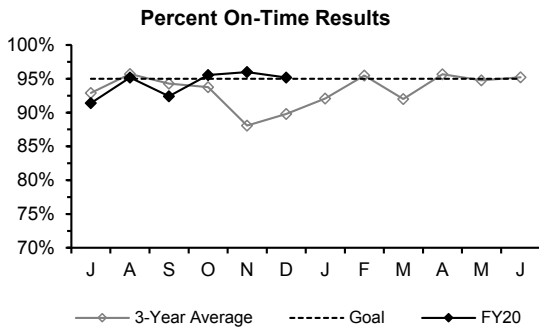
Coordination with other MWRA Departments:

- Assisted with preparation for EPA Inspectors training/tour of Prison Point CSO Treatment Facility on November 20. Assisted DITP Process Control with roll-out updated version of OMS database application, for use by Clinton Operators. Continued to work on the receiving water quality analysis portion of the CSO Post-Construction Monitoring & Performance Assessment project, and to coordinate work by MWRA and consultant staff. Coordinated with DLS and TRAC to collect untreated CSO (one storm) and stormwater samples (four storms).

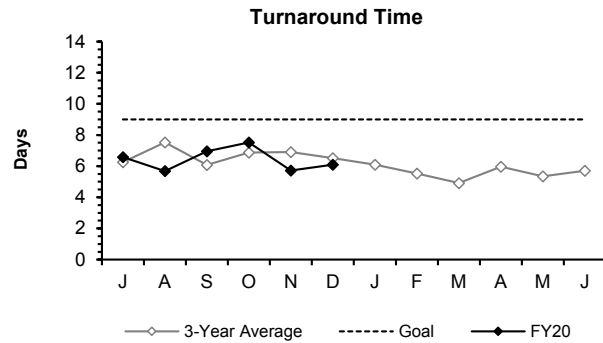
Cooperation with other agencies:

- Coordinated with Cities of Cambridge and Somerville on stormwater sampling for the receiving water quality model. Enqual staff made a presentation to the MWRA Wastewater Advisory Committee on how we communicate MWRA's environmental data. Represented MWRA at the Massachusetts Bays Partnership Management Committee and attended the quarterly meeting of its Boston Harbor Ecosystem Network. Enqual, along with DLS, hosted a meeting between MWRA staff and local watershed associations.

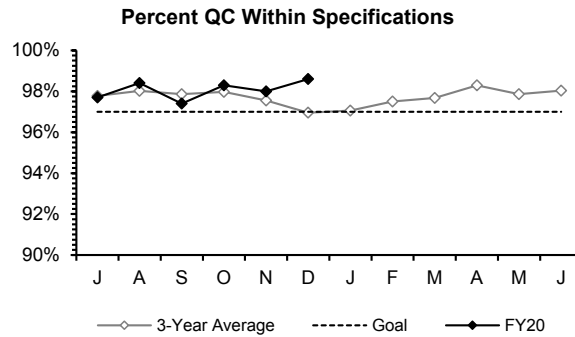
Laboratory Services Second Quarter - FY20



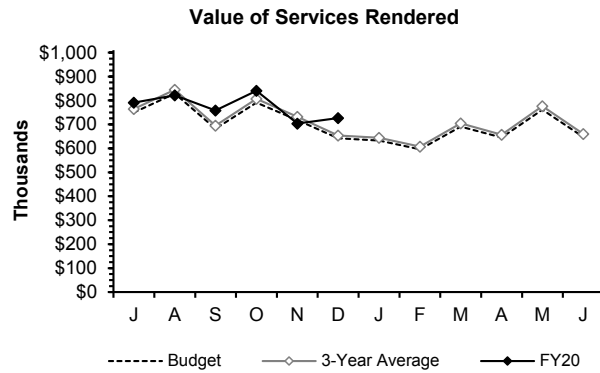
The Percent On-Time measurement met the 95% goal.



Turnaround Time was faster than the 9-day goal.



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



Value of Services Rendered met the annual budget projection.

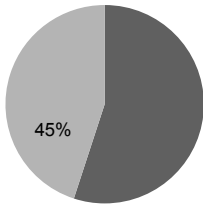
Highlights:

Water: Completed annual lead and copper rule compliance testing. We also performed 681 tests on 332 samples from 69 schools and daycares through the 1st half of FY20. Since 2016 we have performed 37,637 tests on 18,349 samples from 478 schools and daycares.

CONSTRUCTION PROGRAMS

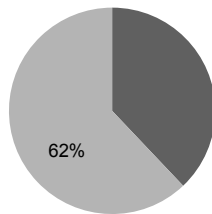
Projects In Construction 2nd Quarter– FY20

Money



- Amount Remaining
- Billed to Date

Time



- Days Remaining
- Days Expended

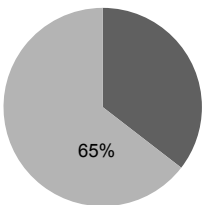
Southern Extra High Pipeline Section 111

Project Summary: This project consists of 6,800 linear feet of 36-inch water main in Dedham and Westwood and includes pipe jacking 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

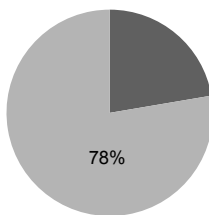
Status and Issues: As of December Crew 1 completed excavation and SOE for pre-cast manhole and installed manhole base for 24" gate valve and 24" DI pipe from MJ Tee at Sta. 1+16 into the structure. Crew 2 Installed 66 LF of 12" DI pipe for DWWD in East St. intersection and 46 LF of 8" DI pipe for DWWD in East St. and Jefferson street Including 3 - 45° MJ bends wrapped with insulated sleeving.

Money



- Amount Remaining
- Billed to Date

Time



- Days Remaining
- Days Expended

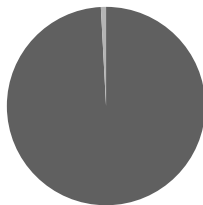
Chelsea Creek Headworks Upgrade

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

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

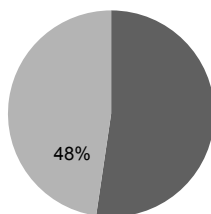
Status and Issues: As of December, the Contractor removed the existing grit pods from the Mezzanine level. They worked on concrete demo at the existing Channel 3 effluent gate thimble and the existing inclined screws framing. Chipped out beam pockets for the Stair A support beams. Saw cut concrete surface around manhole opening for Channel 3 Influent shaft precast planks.

Money



- Amount Remaining
- Billed to Date

Time



- Days Remaining
- Days Expended

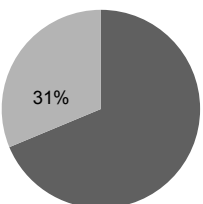
Cottage Farm & Gillis PS Roof Replacement

Project Summary: This project involves the replacement of the rubber roofing membrane system at the Cottage Farm CSO and the Gillis Pumping station.

Notice to Proceed: 10-Jul-2019 *Contract Completion:* 9-Jul-2020

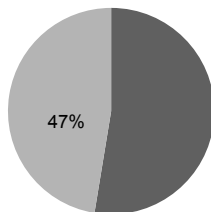
Status and Issues: As of December, the Contractor has provided submittals and a revised HASP, which was accepted by MWRA Safety. No physical work has begun.

Money



- Amount Remaining
- Billed to Date

Time



- Days Remaining
- Days Expended

Commonwealth Ave Pump Station Improvements

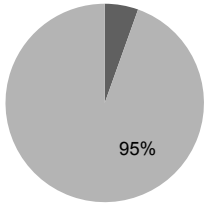
Project Summary: This project will provide a new connection to the station from two low service pipelines in Commonwealth Avenue and add low service pumps so that the City of Newton can be supplied in the event of a City Tunnel failure.

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

Status and Issues: As of December the contractor has continued work at the facility.

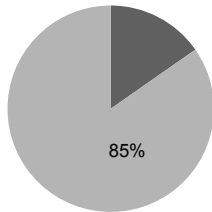
Projects In Construction 2nd Quarter– FY20

Money



■ Amount Remaining
■ Billed to Date

Time



■ Days Remaining
■ Days Expended

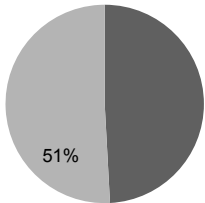
NIH Section 110 - Stoneham

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

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

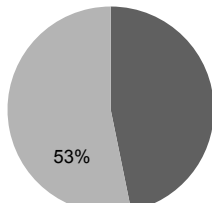
Status and Issues: As of December, the Contractor Disinfection and flushing of Section 110 was completed on November 26, 2019. Activation NIH pipeline occurred on December 16th 2019. Removed traffic message boards. Covered existing detour signage throughout route. Subcontractor installing pipe stands, valve stems and other components inside valve structures along pipeline.

Money



■ Amount Remaining
■ Billed to Date

Time



■ Days Remaining
■ Days Expended

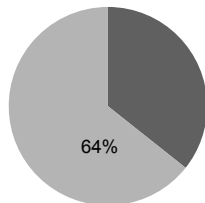
Capital Improvements at the Biosolids Facility

Project Summary: This project involves the replacement of nine mechanical conveyors and ancillary equipment, as well as three sludge processing rotary dryer drums.

Notice to Proceed: 9-Apr-19 *Contract Completion:* 21-Aug-20

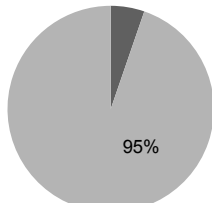
Status and Issues: As of December, the Contractor continued testing of Train #4.

Money



■ Amount Remaining
■ Billed to Date

Time



■ Days Remaining
■ Days Expended

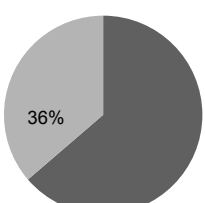
Winthrop Terminal VFD and Motor

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

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

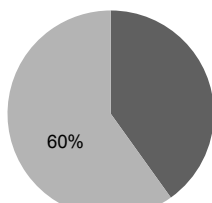
Status and Issues: VFD No. 5 commission test on-going.

Money



■ Amount Remaining
■ Billed to Date

Time



■ Days Remaining
■ Days Expended

Gravity Thickener Rehabilitation

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

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

Status and Issues: As of December, the Contractor cored out previously cut-off anchors and installed new anchor bolts for mechanism. Installed repair mortar to launder exterior wall, interior face. Placed concrete for new pedestals. Continued with sandblasting to prepare walls for resurfacing and coating.

CSO CONTROL PROGRAM

2nd Quarter – FY20

All 35 projects in the Long-Term CSO Control Plan were complete as of December 2015 in compliance schedule milestones in the Federal District Court Order. MWRA is conducting a multi-year CSO post-construction monitoring program and performance assessment that will culminate in a report to EPA and DEP in December 2021 verifying whether the court-ordered long-term levels of CSO control are attained. Of the \$911.1 million budget in the FY20 CIP for the CSO Control Program, approximately \$6.8 million remain to be spent, as described below.

Project/Item	Status as of December 31, 2019
BWSC Dorchester Interceptor Inflow Removal	<p>The CSO MOU/FAA with BWSC included \$5.4 million for additional inflow removal from BWSC's Dorchester Interceptor system as part of the South Dorchester Bay Sewer Separation project, of which MWRA transferred \$1.7 million to the BWSC 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 \$3.76 million from the 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 \$3.76 million.</p> <p>BWSC expects to submit construction contract plans to MWRA for approval, then award the contract, in the fall of 2020, and complete the work within the term of the agreement (by June 30, 2021).</p>
City of Cambridge Memorandum of Understanding and Financial Assistance Agreement	<p>The City of Cambridge attained substantial completion of its last project, CAM004 Sewer Separation, in December 2015 in compliance with Schedule Seven, and attained substantial completion of related surface restoration work by the end of 2017. MWRA made a final transfer of funds to the Cambridge CSO account in December 2017, in the amount of \$1,254,551, to cover eligible costs through June 30, 2018, when the 22 year-old, \$100.2 million MOU/FAA ended.</p> <p>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 February 28, 2020.</p>
City of Somerville Financial Assistance Agreement	<p>By this agreement, MWRA will provide up to \$1.4 million for Somerville's repair of its combined sewer trunk line upstream of the Somerville Marginal CSO Facility. Pursuant to the agreement, the repair work is intended to maintain the full in-system storage capacity of the trunk sewer to support CSO control. Somerville is in design and expects to award the construction contract by the end of 2020.</p>
MWRA CSO Performance Assessment – Contract 7572	<p>MWRA issued the Notice to Proceed with the contract for CSO Post-Construction Monitoring and Performance Assessment to AECOM Technical Services, Inc., in November 2017. The contract includes CSO inspections, overflow metering, hydraulic modeling, system performance assessments and water quality impact assessments, culminating in the submission of a report to EPA and DEP in December 2021 verifying whether the court-ordered levels of CSO control are attained.</p> <ul style="list-style-type: none"> • MWRA issued a third semiannual progress report on October 31, 2019, covering the data collection and CSO discharge quantification period of January 1 – June 30, 2019, and other work progress. • Temporary CSO meters continue to be employed at 36 of the original 57 metered locations, in accordance with Amendment 1 to the AECOM contract. • AECOM completed a major upgrade and recalibration of the MWRA's hydraulic model in November 2019 and is currently addressing questions MWRA has raised concerning meter vs. model differences at certain CSO locations. Calibrated model results allow a comparison of model predicted CSO discharges with the discharges measured from the CSO metering program that began in April 2018. A key objective of the CSO performance assessment is to bring the model and meter results closer together to gain stakeholder confidence in the accuracy of the model in predicting CSO discharges and assessing compliance with the Long Term Control Plan's Typical Year levels of control. • MWRA and AECOM continue to conduct, in close coordination with the CSO communities, investigations into the higher overflow activities measured at several outfalls to better understand the factors contributing to overflows and identify system adjustments that may help bring discharges into compliance with the long-term levels of control. <p>On August 30, 2019, DEP issued five-year CSO variances to water quality standards for the Lower Charles River/Charles Basin and the Alewife Brook/Upper Mystic River effective through August 31, 2024. The variance conditions include receiving water quality modeling and CSO and stormwater sampling; the evaluation of additional CSO controls; other requirements intended to minimize CSO discharges, their impacts and public health risk; and preparation of updated CSO control plans for these waters.</p> <ul style="list-style-type: none"> • AECOM continues to make progress in developing the receiving water models for the Charles River and the Alewife Brook/Upper Mystic River. MWRA staff have continued to perform CSO and stormwater sampling with the assistance of the cities of Cambridge, Somerville, Arlington and Medford, to establish water quality inputs to the models. • Staff are developing a Technical Assistance scope of services to evaluate whether adjustments to the operational strategy for the recently upgraded Alewife Brook Pumping Station can further reduce CSO discharges along the Alewife Brook, as required by the Alewife Brook/Upper Mystic CSO Variance.

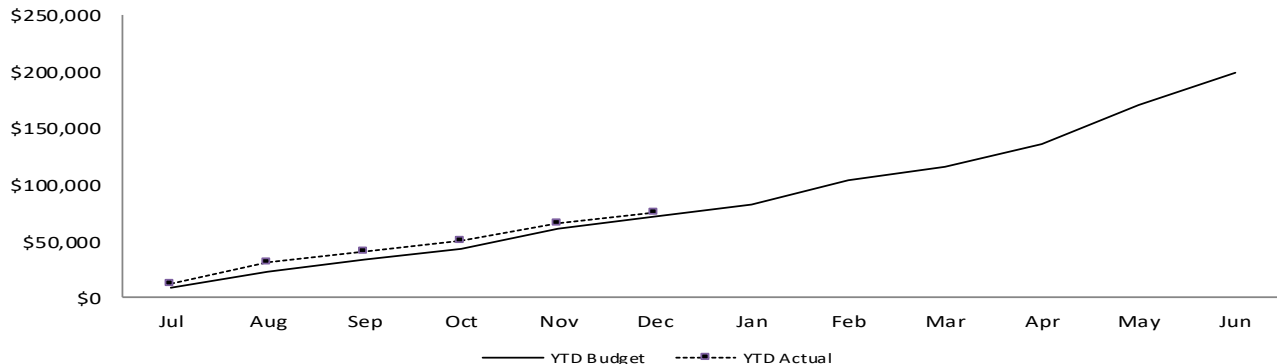
CIP Expenditures 2nd Quarter – FY20

FY20 Capital Improvement Program Expenditure Variances through December by Program (\$ in thousands)				
Program	FY20 Budget Through December	FY20 Actual Through December	Variance Amount	Variance Percent
Wastewater	37,324	47,702	10,378	28%
Waterworks	30,591	25,476	(5,114)	-17%
Business and Operations Support	4,061	1,917	(2,144)	-53%
Total	\$71,976	\$75,095	\$3,119	4%

Project overspending within Wastewater was due to timing of community requests for grants and loans for the Infiltration/Inflow (I/I) Program, contractor progress for the Residuals/Electrical/Mechanical/Drum Dryer Replacements, Chelsea Creek Headworks Upgrades Construction, earlier than anticipated equipment purchases for the Wastewater Meter Equipment project, and work anticipated in FY19 that was completed in FY20 for the Clinton Roofing Rehabilitation. This was partially offset by updated schedule for the Nut Island Odor Control and HVAC Improvements, Dorchester Interceptor Sewer Construction, and timing of work for the Gravity Thickener Rehabilitation contract. Project underspending in Waterworks was due to timing of community loan requests, less than anticipated consultant progress for Section 50/57 Water and Section 21/20/19 Sewer Design contract, underspending of some sub-tasks pending reallocation for the Wachusett Pumping Station Design/ESDC/REI contract, MBTA crossing issue with Construction 3 for the Southern Extra High Section 111 Construction 3, and delay in paving for SEH Construction 2. This was partially offset by timing of watershed land purchases, work anticipated in FY19 that was completed in FY20 for the Cosgrove Intake Roof Repair, and contractor progress for NIH Section 89/29 Redundancy Phase 2 Construction.

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

Total FY20 CIP Budget of \$199,147



Construction Fund Management

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

Cash Balance as of 12/28/19	\$152.3 million
Unused capacity under the debt cap:	\$1.54 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:	\$128 million
Commercial paper capacity / Revolving Loan	\$350 million
Budgeted FY20 Cash Flow Expectancy*:	\$183 million

* Cash based spending is discounted for construction retainage.

DRINKING WATER QUALITY AND SUPPLY

Source Water – Microbial Results and UV Absorbance

2nd Quarter – FY20

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

Sample Site: Wachusett Reservoir

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

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

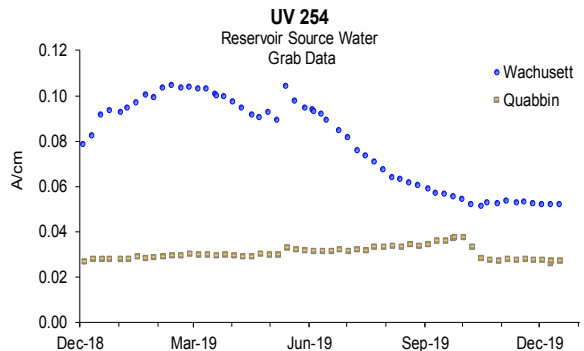
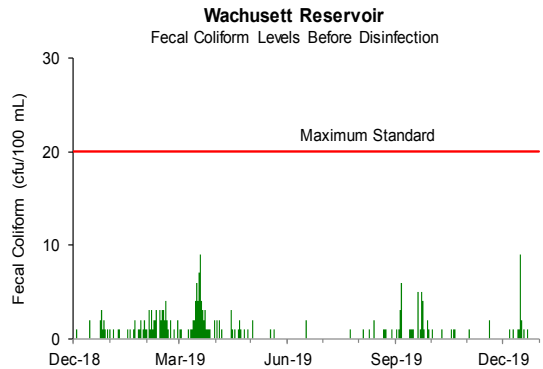
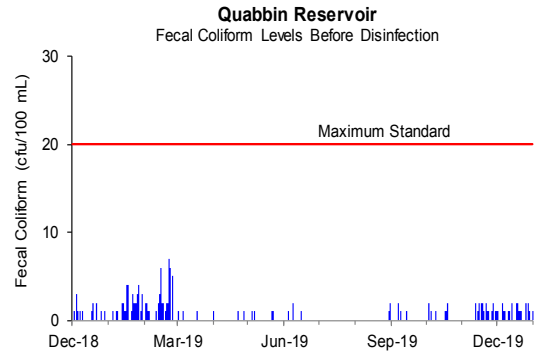
All samples collected during the 2nd Quarter were below 20 cfu/100ml. **For the current six-month period, 0.0% of the samples exceeded a count of 20 cfu/100mL.**

Source Water – UV Absorbance

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

Quabbin Reservoir UV-254 levels are currently around 0.027 A/cm.

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



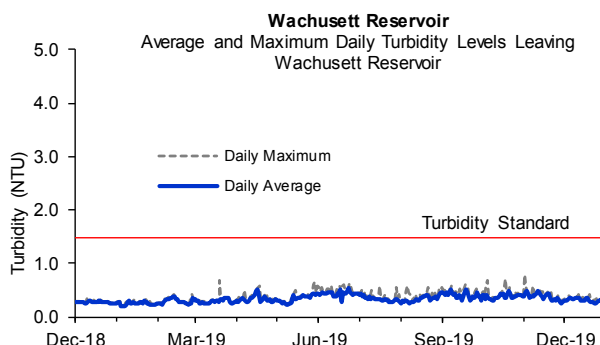
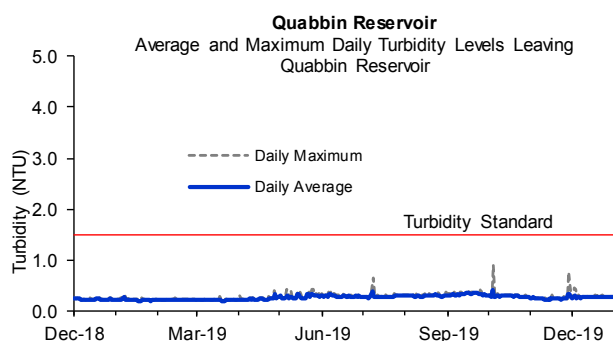
Source Water – Turbidity

2nd Quarter – FY20

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.

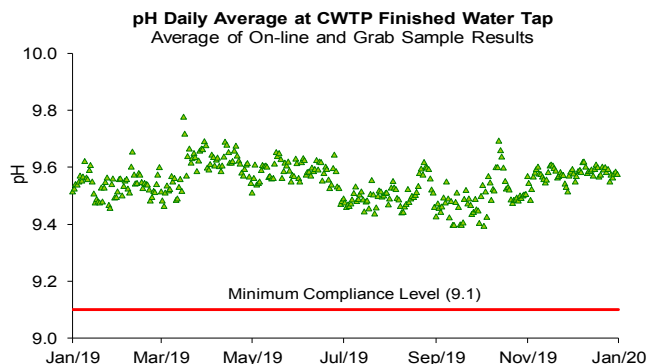
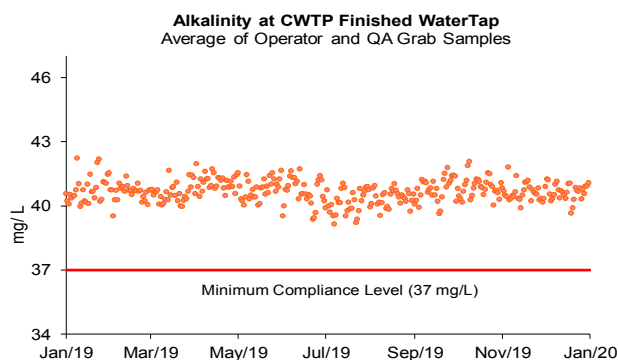


Treated Water – pH and Alkalinity Compliance

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 December 11 and 12, 2019. Distribution system sample pH ranged from 9.1 to 9.7 and alkalinity ranged from 38 to 41 mg/L. No sample results were below DEP limits for this quarter.



Treated Water – Disinfection Effectiveness

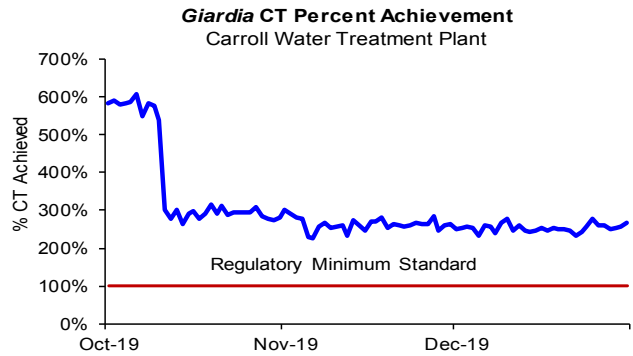
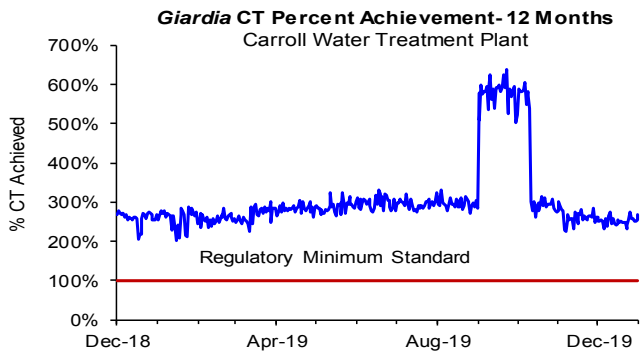
2nd Quarter – FY20

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

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

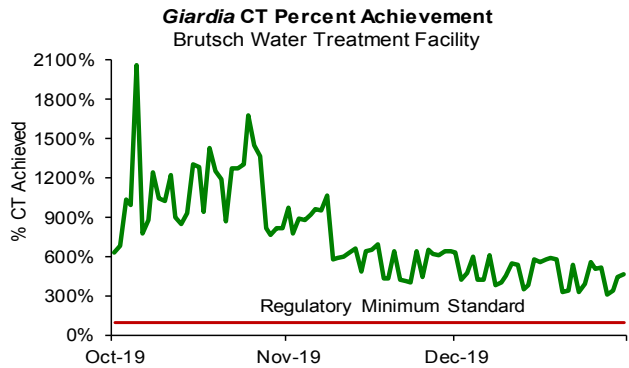
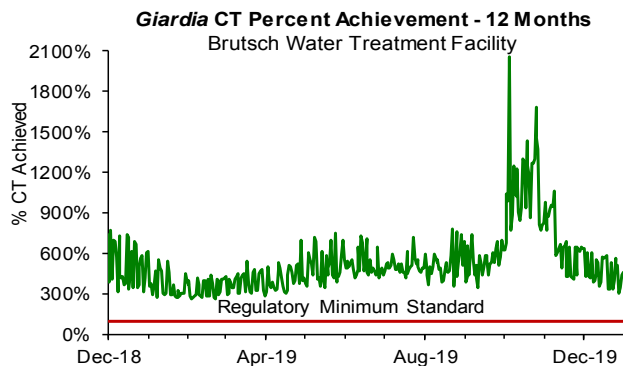
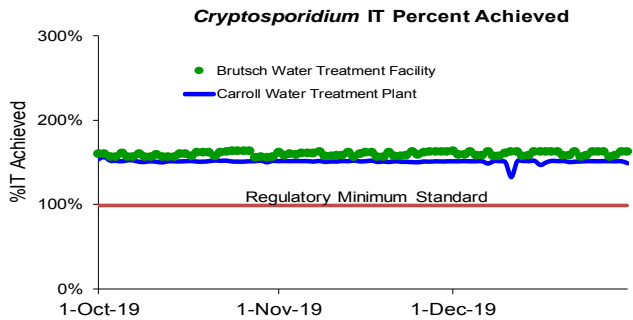
Wachusett Reservoir – MetroWest/Metro Boston Supply:

- Ozone dose at the CWTP varied between 1.7 to 2.8 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 ozone dose was proactively increased from early September to mid October in response to a *Chryso-sphaerella* algae bloom. This is visible in the two top graphs.



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 1.3 to 2.2 mg/L for the quarter.
- Giardia* CT was maintained above 100% at all times the plant was providing water into the distribution system for the quarter.
- Cryptosporidium* IT was maintained above 100% during the month. Off-spec water was less than 5%.



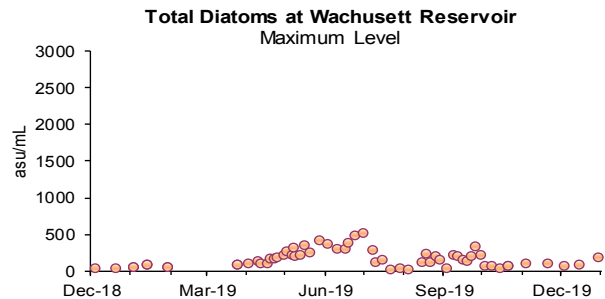
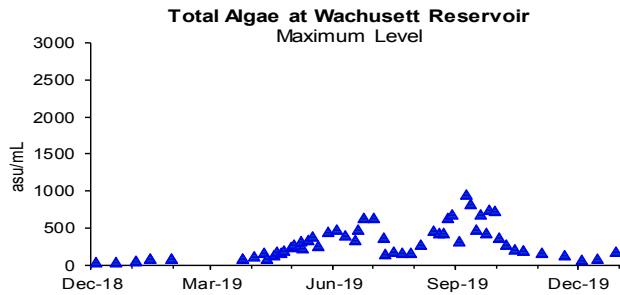
Source Water - Algae

2nd Quarter – FY20

Algae levels in the Wachusett and Quabbin 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 reservoirs with copper sulfate, an algaecide. During the winter and spring, diatom numbers may increase. While not a taste and odor concern, consumers that use filters may notice a more frequent need to change their filters.

In the 2nd quarter, five complaints concerned taste and odor which may be related to algae were reported from the local water departments.

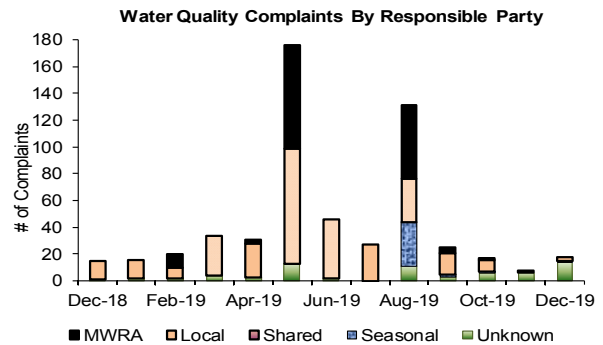
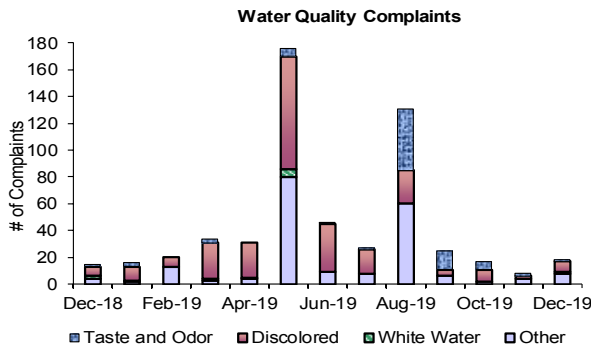


Drinking Water Quality Customer Complaints: Taste, Odor, or Appearance

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 43 complaints during the quarter compared to 65 complaints from 2nd Quarter of FY19. Of these complaints, 19 were for "discolored water", 9 were for "taste and odor", 1 was for "white water", and 14 were for "other". Of these complaints, 14 were local community issues, 1 was an MWRA related issue, 2 were seasonal in nature, and 26 were unknown in origin.



Bacteria & Chlorine Residual Results for Communities in MWRA Testing Program 2nd Quarter – FY20

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.

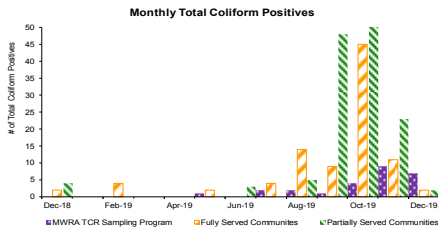
Highlights

In the 2nd Quarter, 143 of the 6,546 community samples (2.19% system-wide) submitted to MWRA labs for analysis tested positive for total coliform (October: Bedford, Everett, Hanscom AFB, Lynnfield, Reading, Winthrop; November: Malden, Bedford, Hanscom AFB; December: Hanscom AFB). Fifteen of the 1,989 Shared Community/MWRA samples (0.96%) tested positive for total coliform. In October, one sample in Reading (10/31) tested positive for *E.coli* with a repeat sample positive for total coliform. This resulted in a town-wide Boil Water Order (an acute violation) and a Level 2 Assessment. DEP lifted the Boil Water Order on November 4. In November, one sample, collected on 11/21, in Framingham tested positive for *E.coli*. Repeat samples did not confirm for total coliform or *E.coli*, thus, no Level Assessment or Boil Water Order was required. Only 2.8% of the Fully Served community samples had chlorine residuals lower than 0.2 mg/L for the quarter. No community violated the TCR.

The following communities needed to conduct level assessments since greater than 5.0% of their samples were total coliform positive during the month: Everett (October, Level 1) and Malden (November, Level 2). The following communities needed to conduct a level assessment since each routinely collects less than 40 samples per month and more than one sample was coliform positive: Lynnfield and Southborough (October, Level 1); Winthrop (October, Level 2); Bedford (October & November, Level 2); Hanscom AFB (October – December, Level 2)

NOTES:

- MWRA total coliform and chlorine residual results include data from community locations. In most cases these community results are indicative of MWRA water as it enters the community system; however, some are strongly influenced by local pipe conditions. Residuals in the MWRA system are typically between 1.0 and 2.8 mg/L.
- The number of samples collected depends on the population served and the number of repeat samples required.
- These communities are partially supplied, and may mix their chlorinated supply with MWRA chloraminated supply.
- Part of the Chicopee Valley Aqueduct System. Free chlorine system.
- MADEP determined that five Somerville total coliform samples collected from one routine sample site (sampling period from October through November) were invalid and not representative of the distribution system. Therefore, they are not represented in the table.



		Total Coliform		E.coli # Positive	Assessment Required	
		# Samples (b)	# (%) Positive			
MWRA	MWRA Locations	354	5 (1.26%)	0		
	Shared Community/MWRA sites	1635	14 (0.86%)	0		
	Total: MWRA	1989	19 (0.96%)	0	No	
Fully Served	ARLINGTON	168	0 (0%)	0		
	BELLEVILLE	104	0 (0%)	0		
	BOSTON	835	15	0	No	
	BROOKLINE	241	0 (0%)	0		
	CHELSEA	188	2	0	No	
	DEER ISLAND	41	0 (0%)	0		
	EVERETT	178	6	1	Yes	
	FRAMINGHAM	247	2	1	No	
	LEXINGTON	117	0 (0%)	0	No	
	LYNNFIELD	27	9	0	Yes	
	MALDEN	264	10	0	Yes	
	MARBLEHEAD	72	0 (0%)	0		
	MARLBOROUGH	128	0 (0%)	0		
	MEDFORD	204	0 (0%)	0		
	MELROSE	117	0 (0%)	0		
	MILTON	105	1	0	No	
	NAHANT	30	0 (0%)	0		
	NEWTON	276	0 (0%)	0		
	NORTHBOROUGH	48	0 (0%)	0		
	NORWOOD	99	0 (0%)	0		
	QUINCY	341	0	0	No	
	READING	153	2	1	Yes	
	REVERE	195	0 (0%)	0		
	SAUGUS	112	0 (0%)	0		
	SOMERVILLE	299	0 (0%)	0		
	SOUTHBOROUGH	36	0	0	Yes	
	STONEHAM	91	0 (0%)	0		
SWAMPSCOTT	57	0 (0%)	0			
WALTHAM	216	0 (0%)	0			
WATERTOWN	131	0 (0%)	0			
WESTON	45	0 (0%)	0			
WINTHROP	79	3	0	Yes		
	Total: Fully Served	5244	60 (1.14%)			
Partially Served	BEDFORD	102	50	0	Yes	
	CANTON	93	1	0	No	
	HANSCOM AFB	57	27	0	Yes	
	NEEDHAM	124	0 (0%)	0	No	
	PEABODY	214	0 (0%)	0		
	WAKEFIELD	148	3	0	No	
	WELLESLEY	117	1	0	No	
	WILMINGTON	87	0 (0%)	0	No	
	WINCHESTER	94	1	0	No	
	WOBURN	195	0 (0%)	0	No	
	SOUTH HADLEY FD1	60	0 (0%)	0		
		Total: CVA & Partially Served	1291	83 (6.43%)		
		Total: Community Samples	6535	143 (2.19%)		

Chlorine Residuals in Fully Served Communities

	2018		2019											
	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
% <0.1	0.2	0.3	0.2	0.1	0.0	0.0	0.0	0.2	0.3	0.7	1.1	1.7	0.2	
% <0.2	1.0	0.3	0.2	0.1	0.1	0.1	0.1	0.7	1.3	2.3	3.3	3.3	1.5	
% <0.5	2.3	1.1	0.6	0.4	0.3	0.3	0.9	2.5	4.5	7.2	8.7	7.7	4.1	
% <1.0	5.2	2.8	1.8	1.7	1.4	1.9	3.2	7.0	11.0	14.9	17.8	12.6	7.3	
% >1.0	94.8	97.2	98.2	98.4	98.7	98.1	96.8	93.0	89.0	85.1	82.2	87.4	92.7	

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

2nd Quarter – FY20

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 calculated quarterly at each individual sampling location must be below the Total HAA5 or Total TTHM MCL standard. The charts below show the highest and lowest single values for all sites, and the LRAA of the highest location each quarter.

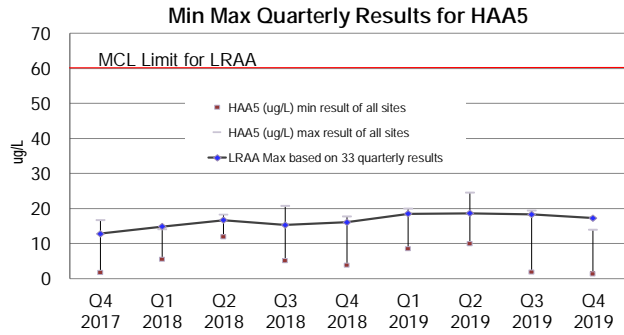
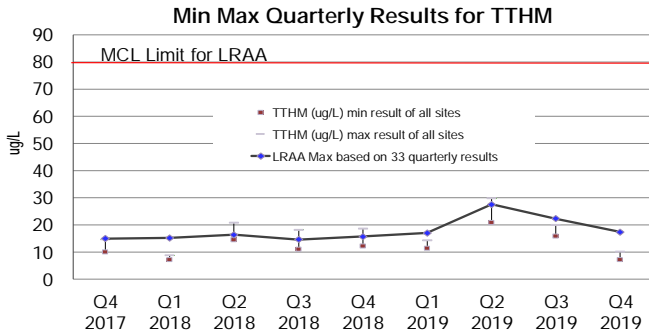
Partially served and CVA communities are responsible for their own compliance monitoring and reporting, and must be contacted directly for their individual results. The chart below combines data for all three CVA communities data (Chicopee, Wilbraham and South Hadley FD1). Although, they are separately regulated, however each community is regulated individually.

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

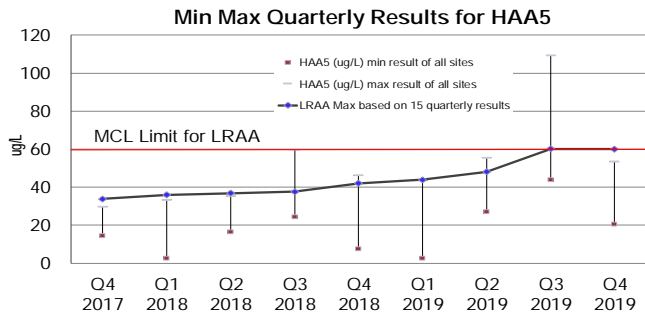
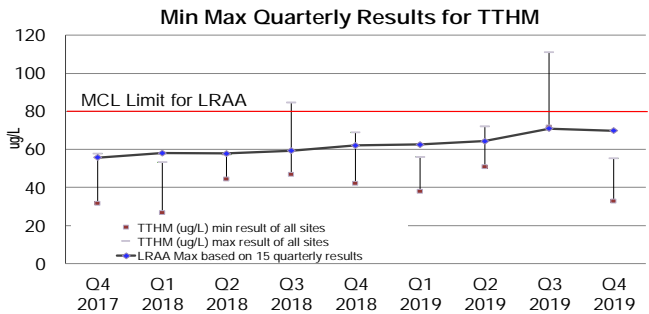
The LRAA for TTHMs and HAA5s for MWRA’s Compliance Program (represented as the line in the top two graphs below) remain below current standards. The Max LRAA in the quarter for TTHMs = 17.5 µg/L; HAA5s = 17.3 µg/L. The current RAA for Bromate = 0.0 µg/L. During the Q3 2019 sampling, two CVA communities exceeded Operational Evaluation Levels for HAA5 or Total Trihalomethanes. During the Q4 2019 sampling, one CVA community exceeded Operational Evaluation Levels for HAA5. While this does not result in a violation this requires an analysis and review of their water system and a report to MADEP. No LRAA exceedances or violations occurred this quarter for any of the CVA communities. MWRA and the CVA communities continue to closely monitor and manage the disinfection process to minimize DBP production.

A quarterly DBP location in South Hadley was added in Q4, 2019.

MetroBoston Disinfection By-Products



CVA Disinfection By-Products (Combined Results)



Water Supply and Source Water Management

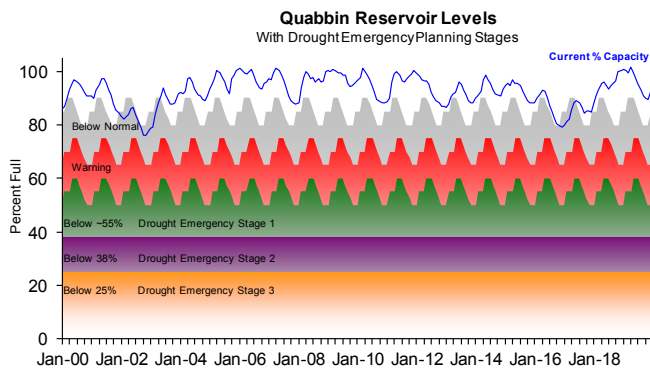
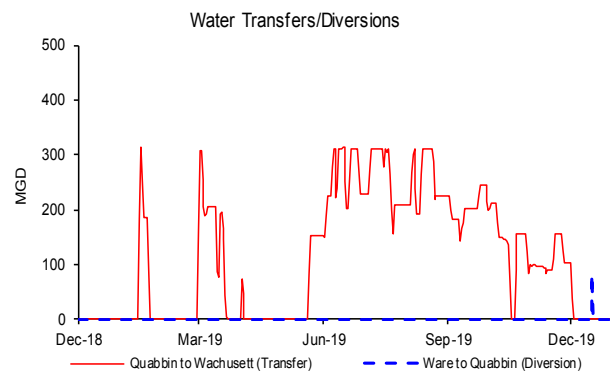
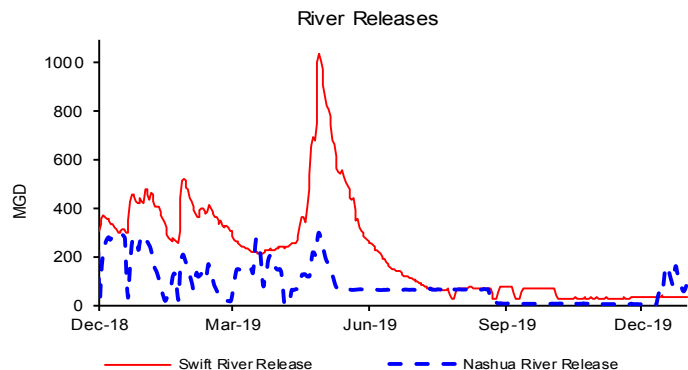
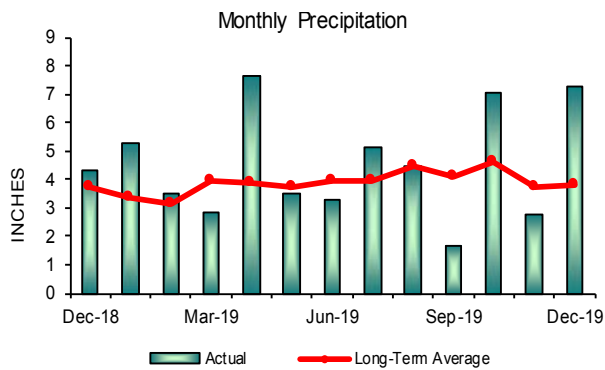
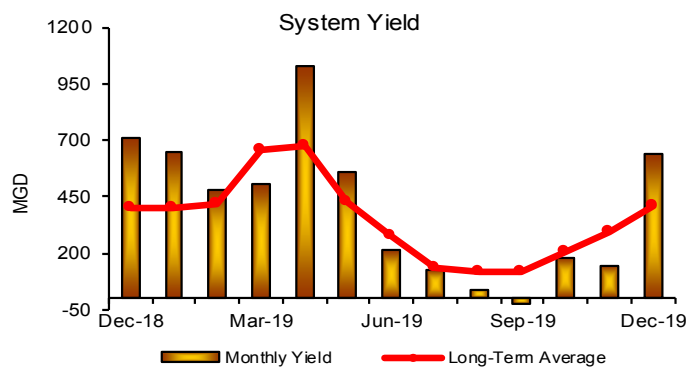
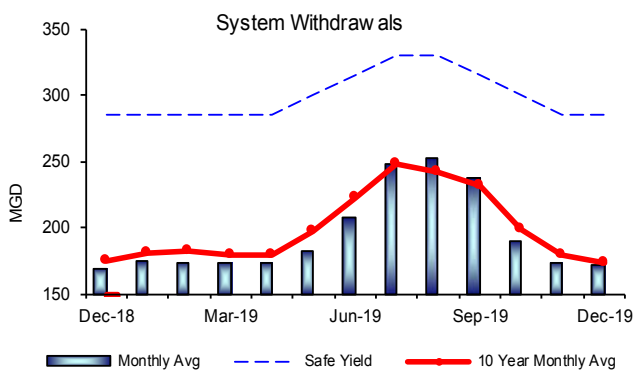
2nd Quarter – FY20

Background

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

Outcome

The volume of the Quabbin Reservoir was at 92.1% as of December 31, 2019; a 1.5% increase for the quarter, which represents an addition of more than 6.2 billion gallons of storage and an increase in elevation of 0.83' 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.



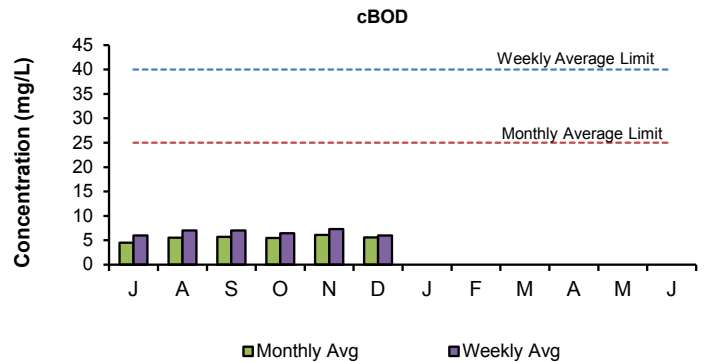
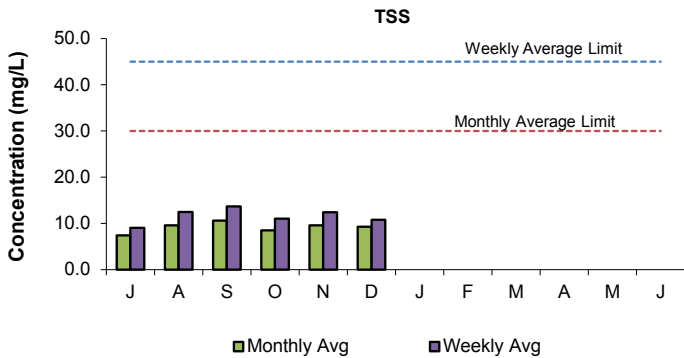
WASTEWATER QUALITY

NPDES Permit Compliance: Deer Island Treatment Plant 2nd Quarter - FY20

NPDES Permit Limits

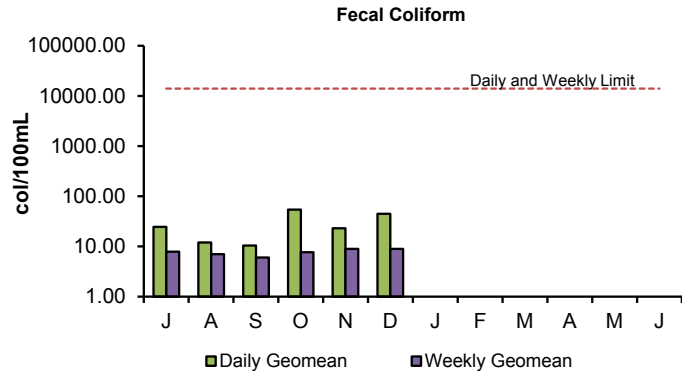
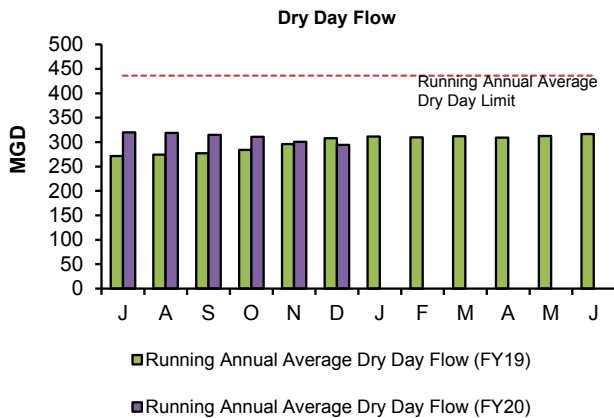
Effluent Characteristics	Units	Limits	October	November	December	2nd Quarter Violations	FY20 YTD Violations	
Dry Day Flow (365 Day Average):	mgd	436	310.8	300.4	294.5	0	0	
cBOD:	Monthly Average	mg/L	5.5	6.1	5.6	0	0	
	Weekly Average	mg/L	40	6.4	7.3	6.0	0	0
TSS:	Monthly Average	mg/L	30	8.5	9.6	9.3	0	0
	Weekly Average	mg/L	45	11.0	12.4	10.8	0	0
TCR:	Monthly Average	ug/L	456	0	0	0.54	0	0
	Daily Maximum	ug/L	631	0	0	16.67	0	0
Fecal Coliform:	Daily Geometric Mean	col/100mL	14000	54	23	45	0	0
	Weekly Geometric Mean	col/100mL	14000	8	9	9	0	0
	% of Samples >14000	%	10	0	0	0	0	0
	Consecutive Samples >14000	#	3	0	0	0	0	0
pH:	SU	6.0-9.0	6.5-7.05	6.6-7.1	6.5-7.0	0	0	
PCB, Aroclors:	Monthly Average	ug/L	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	100	0	0

There have been no permit violations in FY20 to date at the Deer Island Treatment Plant (DITP).



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

Carbonaceous Biochemical Oxygen Demand (cBOD) is a measure of the amount of dissolved oxygen required for the decomposition of organic materials in the environment. All cBOD measurements for the 2nd Quarter 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 2nd Quarter was well below the permit limit of 436 MGD.

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

NPDES Permit Compliance: Clinton Wastewater Treatment Plant
2nd Quarter - FY20

NPDES Permit Limits

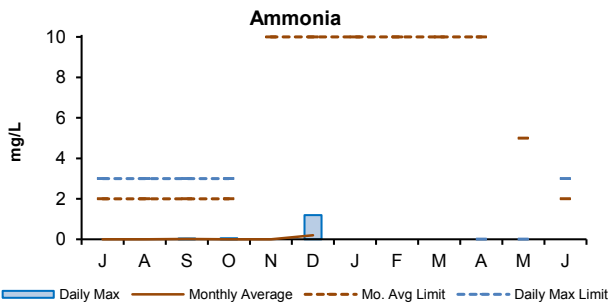
Effluent Characteristics		Units	Limits	October	November	December	2nd Quarter Violations	FY20 YTD Violations
Flow:	12-month Rolling Average:	mgd	3.01	2.92	2.62	2.53	0	3
BOD:	Monthly Average:	mg/L	20	1.40	1.60	2.50	0	0
	Weekly Average:	mg/L	20	1.60	2.60	3.20	0	0
TSS:	Monthly Average:	mg/L	20	0.40	1.70	3.80	0	0
	Weekly Average:	mg/L	20	1.30	4.20	6.60	0	0
pH:		SU	6.5-8.3	7.2-7.6	7.1-7.6	7-7.6	0	0
Dissolved Oxygen:	Daily Average Minimum:	mg/L	6	8.40	9.00	9.70	0	0
E. Coli:	Monthly Geometric Mean:	cfu/100mL	126	5	6	8	0	0
	Daily Geometric Mean:	cfu/100mL	409	7	189	70	0	0
TCR:	Monthly Average:	ug/L	17.6	0.00	0.00	0.24	0	0
	Daily Maximum:	ug/L	30.4	0.00	0.00	4.00	0	0
Copper:	Monthly Average:	ug/L	11.6	9.62	7.10	8.33	0	0
	Daily Maximum:	ug/L	14.0	9.62	7.10	8.63	0	0
Total Ammonia Nitrogen: November 1st - March 31st	Monthly Average:	mg/L	10.0	0.00	0.00	0.20	0	0
	Daily Maximum:	mg/L	35.2	0.05	0.00	1.20	0	0
Total Phosphorus: November 1st - March 31st	Monthly Average:	ug/L	1000	59	157	184	0	0
	Daily Maximum:	ug/L	RPT	80	365	302	0	0
Acute Toxicity*:	Daily Minimum:	%	≥100	N/A	N/A	>100	0	0
Chronic Toxicity*:	Daily Minimum:	%	≥62.5	N/A	N/A	100	0	0

There have been three permit violations in FY20 at the Clinton Treatment Plant.

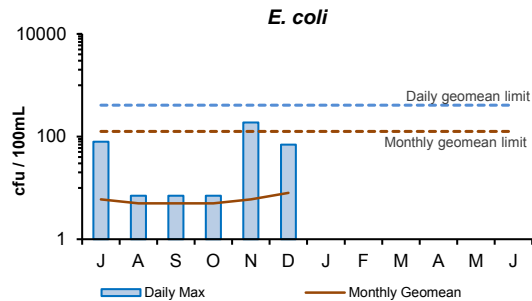
1st Quarter: There were three permit violations in the first quarter. The 12-month rolling average flow exceeded the limit of 3.01 MGD due to excessive rains in the region in late 2018.

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

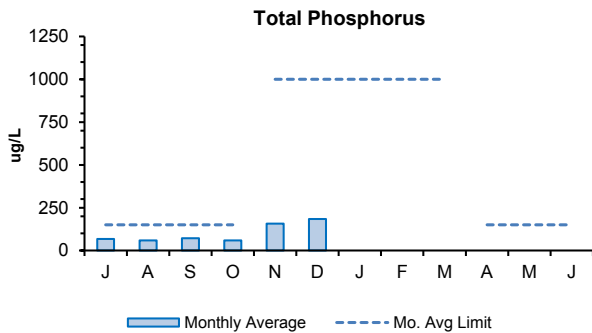
+ Toxicity testing at the Clinton Treatment Plant is conducted on a quarterly basis.



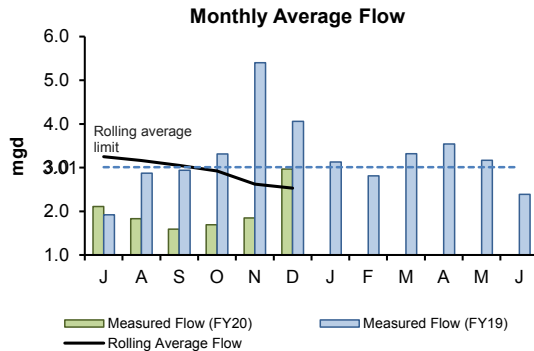
The 2nd Quarter's monthly average and daily maximum concentrations of ammonia were below the permit limits. The monthly average and daily maximum limits for the 2nd Quarter are 10 and 35.2 mg/L respectively. The permit limits are most stringent from June to October when warm weather conditions are most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



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



The 2nd Quarter's monthly average concentrations for total phosphorus were below permit limits. The new seasonal permit limits went into effect April 1, 2019.

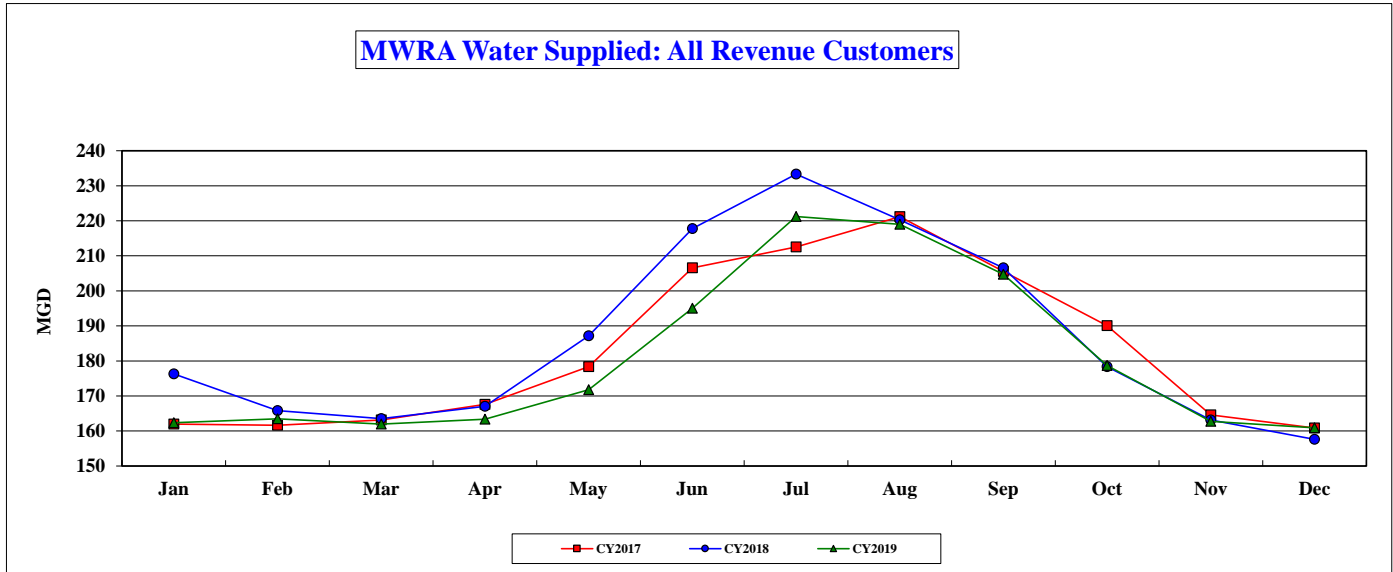


The graph depicts the rolling annual average monthly flow, measured in million gallons per day, exiting the plant. The 12-month rolling average flows during the 2nd Quarter were below the permit limit.

COMMUNITY FLOWS AND PROGRAMS

Customer Water Use

2nd Quarter - FY20



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	186.553	186.553
CY2019	162.367	163.492	161.984	163.350	171.773	195.028	221.222	219.012	204.699	178.714	162.736	160.906	180.568	180.568

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	68,091.978	68,091.978
CY2019	5,033.382	4,577.770	5,021.509	4,900.488	5,324.950	5,850.846	6,857.872	6,789.370	6,140.970	5,540.145	4,882.089	4,988.092	65,907.485	65,907.485

The December 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.

MWRA customers used an averaged of 167.5 mgd in the 2nd quarter of FY20. This is an increase of 1.1 mgd or 0.7% compared to the 2nd quarter of FY19. System-wide year to date consumption for CY19 was lower than CY18 with 180.6 mgd being supplied to MWRA customers. This is 6.0 mgd lower than CY18, and is a decrease of 3.2%.

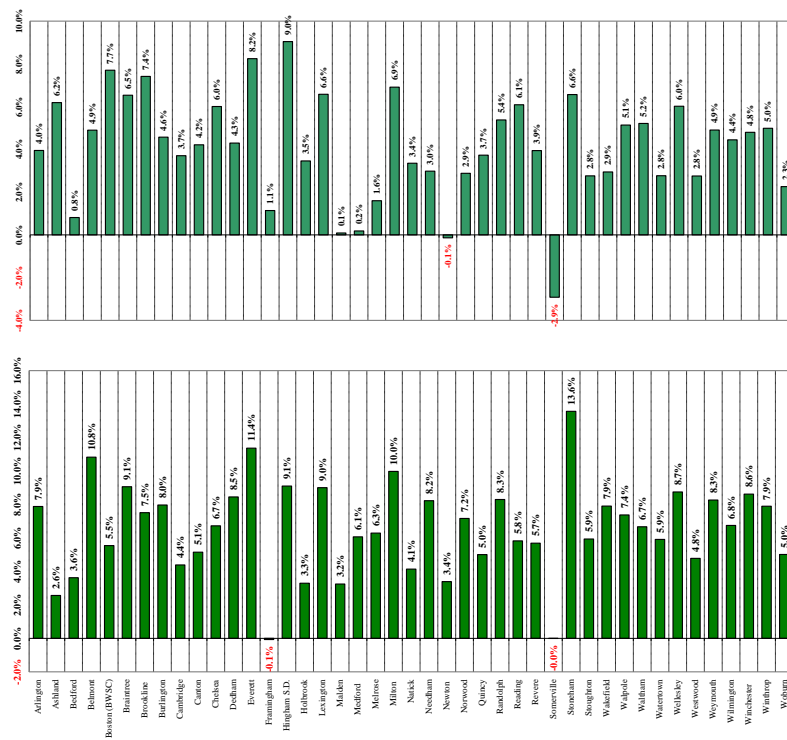
Community Wastewater Flows

2nd Quarter - FY20

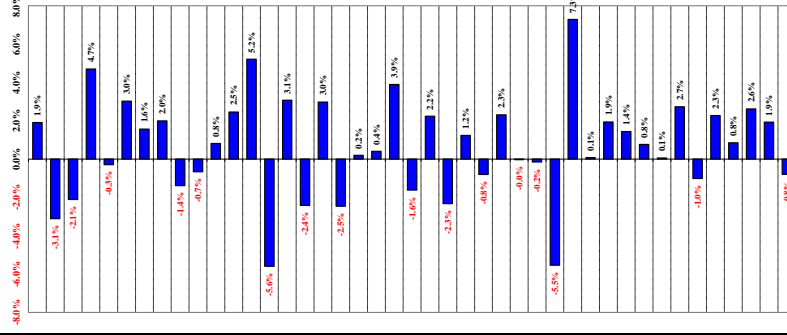
How Projected CY2019 Community Wastewater Flows Could Effect FY2021 Sewer Assessments ^{1,2,3}

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.

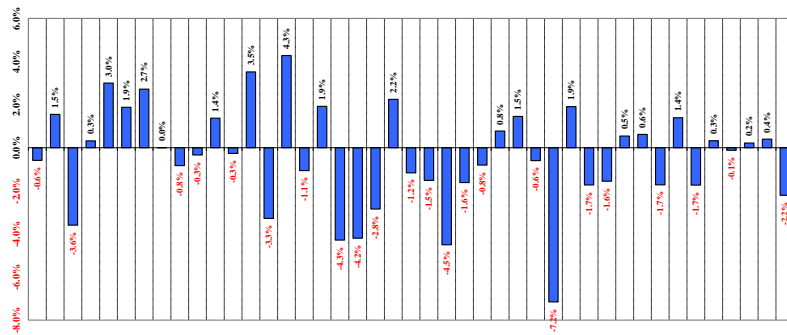
Change in Average Flow



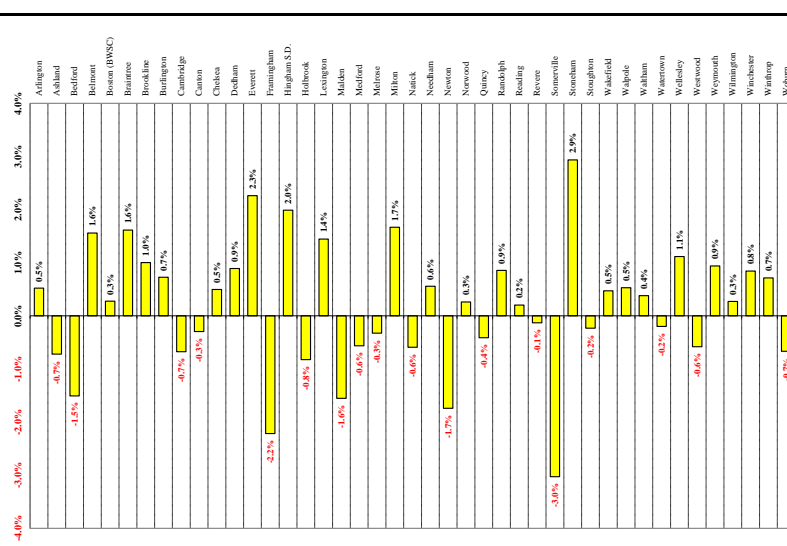
Change in Max. Month Flow



Change in Average Flow Share



Change in Max. Month Flow Share



Assessment Impact Due to Change in Flow Share

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

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

² Based on CY2016 to CY2019 average wastewater flows as of 02/04/20. Flow data is preliminary and subject to change pending additional MWRA and community review.

³ CY2016 to CY2019 wastewater flows based on actual meter data.

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

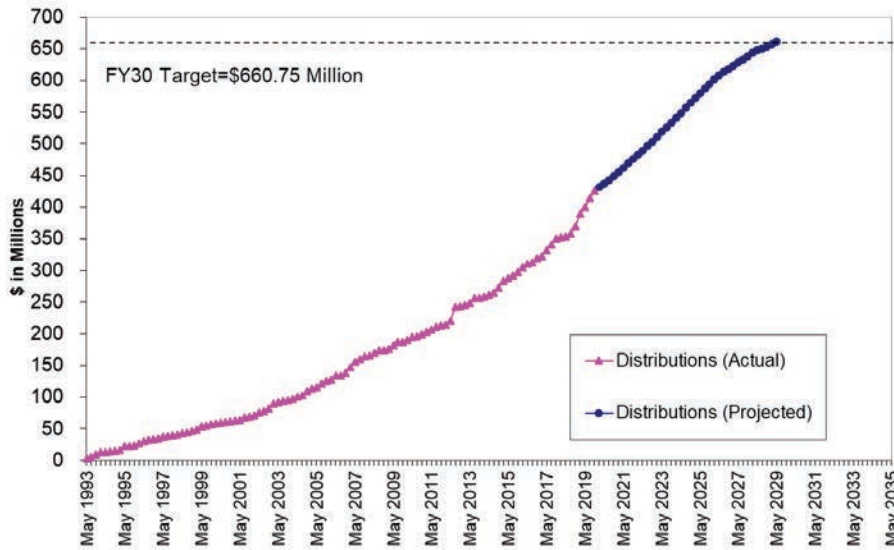
Community Support Programs

2nd Quarter – FY20

Infiltration/Inflow Local Financial Assistance Program

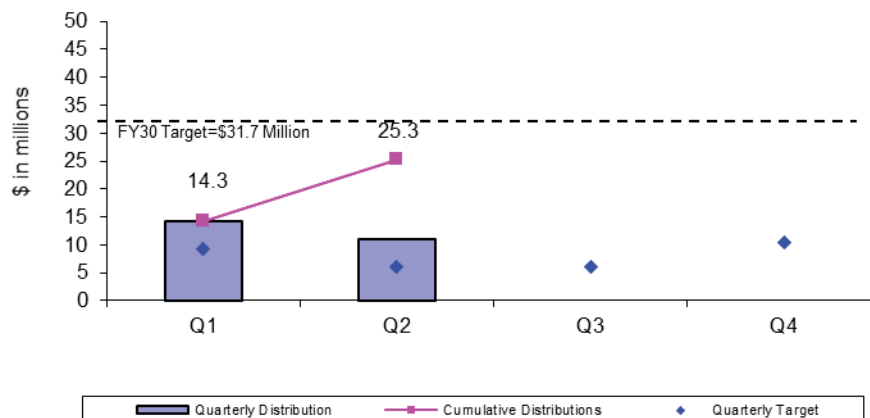
MWRA's Infiltration/Inflow (I/I) Local Financial Assistance Program provides \$760.75 million in grants and interest-free loans (average of about \$20 million per year from FY93 through FY30) to member sewer communities to perform I/I reduction and sewer system rehabilitation projects within their locally-owned 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. 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 2nd Quarter of FY20, \$11.0 million in financial assistance (grants and interest-free loans) was distributed to fund local sewer rehabilitation projects in Braintree, Dedham, Lexington, Melrose, Needham, Stoughton, Walpole, Watertown, Wilmington, and Woburn. Total grant/loan distribution for FY20 is \$25.3 million. From FY93 through the 2nd Quarter of FY20, all 43 member sewer communities have participated in the program and \$426 million has been distributed to fund 593 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.

FY20 Quarterly Distributions of Sewer Grant/Loans



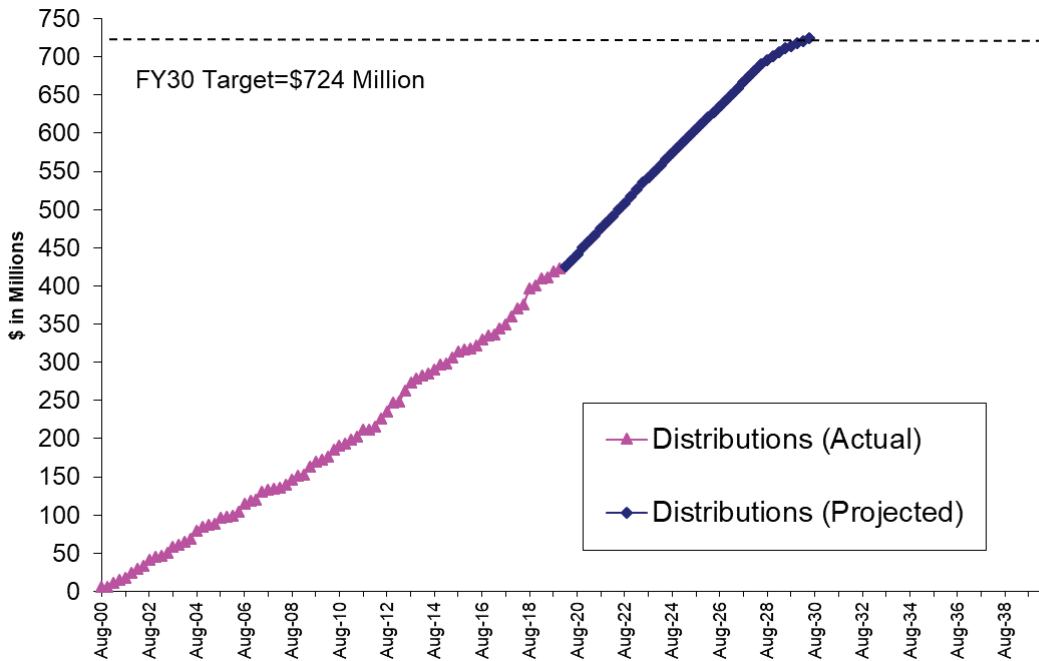
Community Support Programs

2nd Quarter – FY20

Local Water System Assistance Program

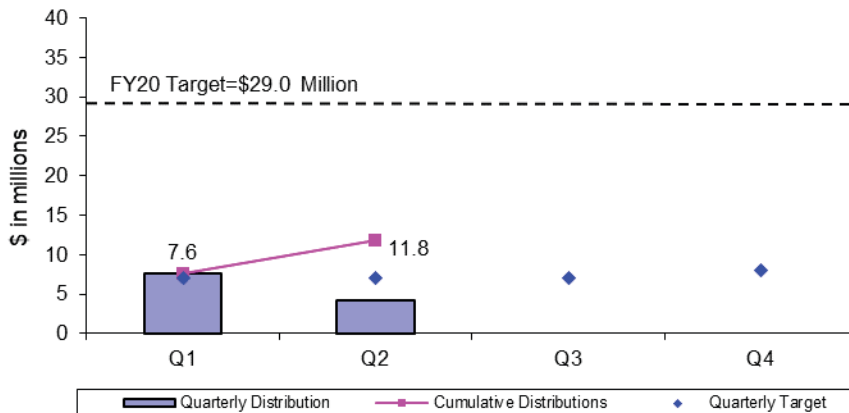
MWRA's Local Water System Assistance Programs (LWSAP) provides \$724 million in interest-free loans (an average of about \$24 million per year from FY01 through FY30) to member water communities to perform water main rehabilitation projects within their locally-owned water distribution systems. There 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 2nd Quarter of FY20, \$4.2 million in interest-free loans was distributed to fund local water projects in Everett, Melrose, Newton, and Saugus. Total loan distribution for FY20 is \$11.8 million. From FY01 through the 2nd Quarter of FY20, \$423.4 million has been distributed to fund 458 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.

FY20 Quarterly Distributions of Water Loans



Community Support Programs 2nd Quarter – FY20

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.

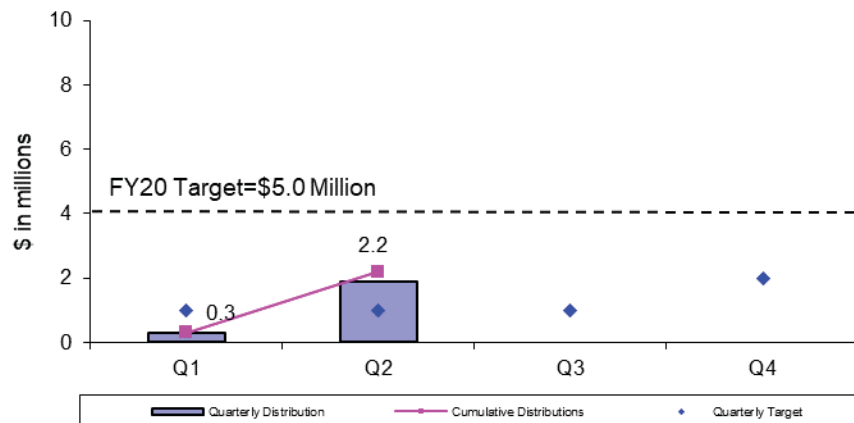
FY19 was the third year of the Lead Loan Program. During FY19, MWRA made four Lead Loan Program distributions as noted in the table below.

FY20 is the fourth year of the Lead Loan Program. One Lead Loan was made during the 1st quarter of FY20: \$300,000 to Chelsea. Two Lead Loans were made during the 2nd quarter of FY20: \$1.0 Million to Everett and \$900,000 to Somerville.

Summary of Lead Loans:

Everett in FY20	\$1.0 Million
Somerville in FY20	\$0.9 Million
Chelsea in FY20	\$0.3 Million
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
<u>Winchester in FY17</u>	<u>\$0.5 Million</u>
TOTAL	\$13.8 Million

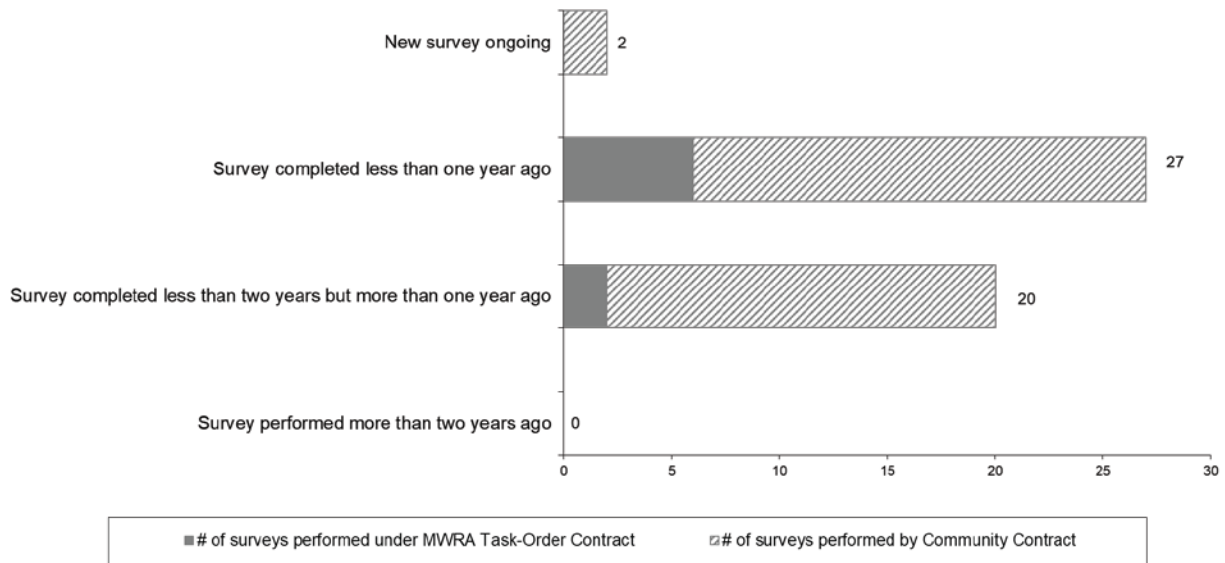
FY20 Quarterly Distributions of Lead Service Line Replacement Loans



Community Support Programs 2nd Quarter – FY20

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 2nd Quarter of FY20, 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	640	19,735			20,375
Low-Flow Fixtures (showerheads and faucet aerators)	10,000	791	832			1,623
Toilet Leak Detection Dye Tablets	—	419	35,431			35,850

BUSINESS SERVICES

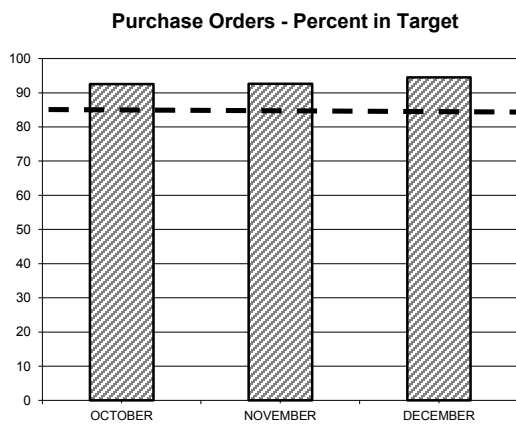
Procurement: Purchasing and Contracts

2nd Quarter - FY20

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

Outcome: Processed 94% of purchase orders within target; Average Processing Time was 4.42 days vs. 5.23 days in Qtr 2 of FY19. Processed 67% (8 of 12) of contracts within target timeframes; Average Processing Time was 116 days vs. 192 days in Qtr 2 of FY19.

Purchasing



	No.	TARGET	PERCENT IN TARGET
\$0 - \$500	671	3 DAYS	90.7%
\$500 - \$2K	628	7 DAYS	97.6%
\$2K - \$5K	453	10 DAYS	97.5%
\$5K - \$10K	56	25 DAYS	83.9%
\$10K - \$25K	54	30 DAYS	85.1%
\$25K - \$50K	15	60 DAYS	73.3%
Over \$50K	25	90 DAYS	92.0%

The Purchasing Unit processed 1902 purchase orders, 11 less than the 1913 processed in Qtr 2 of FY19 for a total value of \$10,770,038 versus a dollar value of \$24,523,913 in Qtr 2 of FY19.

The purchase order processing target was not met for the \$5K-\$10K category due to end user evaluations and sole source requirements and the \$25K-\$50K category due to staff summary and sole source requirements.

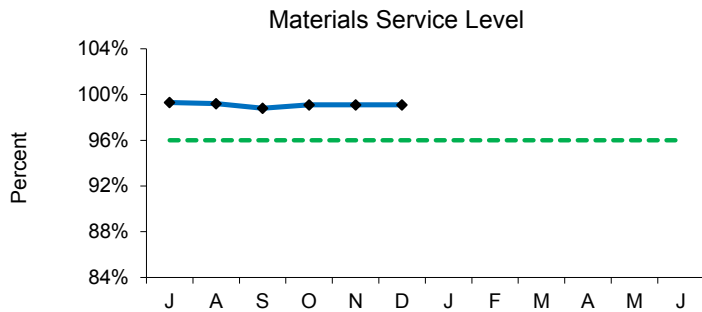
Contracts, Change Orders and Amendments

Procurement processed twelve contracts with a value of \$27,998,868 and four amendments with a value of \$983,372. Twenty five change orders were executed during the period. The dollar value of all non-credit change orders during Q2 FY20 was \$1,808,571 and the value of credit change orders was (\$478,129).

Four contracts were not processed within the target timeframes. One contract (Insurane Broker Services FY20) was delayed due to additional insurance requirements necessary for insurance services. Insurance for all categories of coverage was obtained timely and according to schedule. A second contract was delayed due to a delay in the submittal of E-tables by the consultant. Another contract was delayed due to a delay in the submittal of financial statements by the contractor resulting in the need to process a change order. The final contract was delayed due to an unanticipated procurement issue which required the contract to be re-bid.

Staff reviewed 29 proposed change orders and 31 draft change orders.

Materials Management 2nd Quarter - FY20



The service level is the percentage of stock requests filled. The goal is to maintain a service level of 96%. Staff issued 7,554 (99.1%) of the 7,621 items requested in Q2 from the inventory locations for a total dollar value of \$1,380,780.

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 FY20 goal is to reduce consumable inventory from the July '19 base level (\$8.4 million) by 2.0% (approximately \$169,249), to \$8.2 million by June 30, 2020 (see chart below).

Items added to inventory this quarter include:

- Deer Island – sensor cables, transmitters, junction boxes, flowmeters, flame sensor, signal processors and programmer for I&C; LED light fixtures for Electrical; diaphragm valve, hydrogen peroxide, gate operator, shim kits and motor control starters for Maintenance.
- Chelsea – LED lamps, ball valves, couplings, thermocouple and pressure switches for Work Coordination; air filters, lights, sensors and hydraulic couplers for Fleet Services; light fixtures for Electrical; manhole frames and covers for Pipeline; easel pads for Training; Permethrin repellent for Materials Management; square point shovels for Field Operations.
- Southboro – bleach wipes for Lab; air filters for Fleet Services.

Property Pass Program:

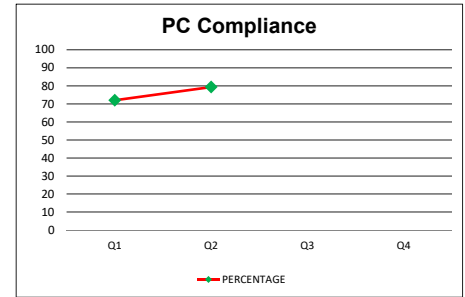
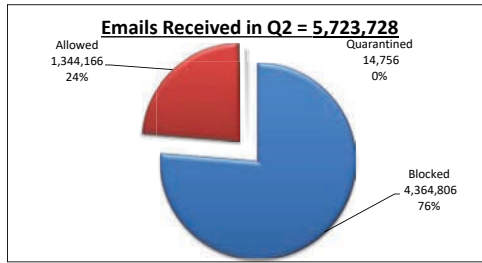
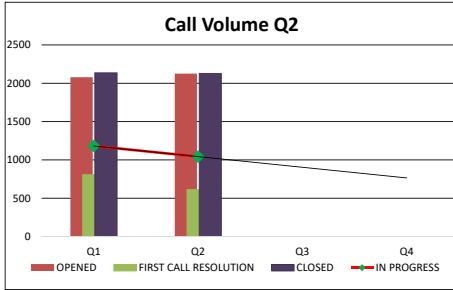
- Five audits were conducted during Q2.
- Scrap revenue received for Q2 amounted to 11,522. Year to date revenue received amounted to \$17,864.
- Revenue received from online auctions held during Q2 amounted to 72,318. Year to date revenue received amounted to \$187,037.

Items	Base Value July-19	Current Value w/o Cumulative New Adds	Reduction / Increase To Base
Consumable Inventory Value	8,462,463	8,576,666	-83,399
Spare Parts Inventory Value	9,183,923	9,044,929	-135,260
Total Inventory Value	17,646,386	17,621,595	-24,791

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

MIS Program

2nd Quarter - FY20



Performance & Backlog for Q2

- 2128 calls were completed this quarter.
- Call closure averaged 7.1 days.
- Priority 1 & 2 Service Level Agreements (SLA) were met this quarter.

Cyber Security Q2

- In Q2, pushed 176 security fixes/updates to desktops/servers. 87% of all PCs/Laptops are compliant with approved patches.
- McAfee quarantined 11 distinct viruses from 10 PCs. PCs are current with antivirus signatures for known malware.
- 76% of all email was blocked upon initial receipt and evaluation.

Audio/Visual Upgrades: Vendor bids were received in October and vendor was selected in November. Purchase order was awarded in December and installations are set to begin in January 2020.

Exchange Upgrade: Exchange 2016 environment has been built. Change management activities have been approved to make the necessary changes in the production environment.

AWIA Risk and Resiliency Assessment: Purchase Order awarded to JANUS Associates. Phase 1 of cyber security assessment has begun and the final report for Phase 1 will be available at the end of January 2020.

Chelsea Environmental Controls Monitoring System: Original RFPQ posted in November. Revised Statement of Work (SOW) to be reposted in January 2020.

PBX (Telephone System) Upgrade: The Statement of Work (SOW) is being drafted for a new solution. The submission to procurement is planned for January 2020.

Infrastructure Upgrades: Clinton Treatment Plant server hardware infrastructure refresh and network circuit upgrade completed. Server hardware for Chelsea has been received and is being configured.

DI Ops Hardware Segmentation: File Servers and Print Servers are migrated. The application server migration will continue after Exchange project is completed.

Infor/Lawson Upgrade: The Statement of Work (SOW) has been drafted and is under review.

Maximo: Implemented multiple enhancements to the user interface in the Labor, Workorder Tracking, Preventative Maintenance (TR), and Self Service Applications.

System Updates: Version upgrades were completed for Portia, PIMS, and Crystal Reports.

Enterprise Content Management (ECM)/e-Construction: Posted ECM Event on Supplier portal including RFQ/P, SOW, and all related appendices and attachments. Began collecting and categorizing bidder's questions. Posted two new attachments on Supplier Portal - Attachment 1 Answers to Vendors questions and Attachment 2 Addenda to the SOW. In addition, Procurement extended Q&A to allow plan holders to submit any additional questions until Jan 3.

Dental Certifications Application: Demonstrated complete functionality to user Subject Matter Experts (SMEs) and management. Supported user testing and compiled initial User Acceptance Test (UAT) results. Began developing user training and job aid documents in preparation for a pilot dental office implementation in Q3.

Contracts Management: The MWRA's first Professional Services Contract went live on the Supplier Portal completing the implementation of the major Contract Types. Non-professional Services, MGL Chapter 30 Construction Contracts and MGL Chapter 149 Construction Contracts went live prior to this contract type.

Library & Records Center: The Library undertook 16 research requests, supplied 45 books for circulation, provided 25 articles, and 18 standards. The MWRA Library Portal supported 590 end user searches. Research topics included: Per- and Polyfluoroalkyl substances (PFAS) related to drinking water, funding opportunities for Electronic Vehicle charging stations, Amyntas agrestis (crazy worm) and the forest floor, and control systems cybersecurity. The Record Center (RC) added 105 new boxes to the RC and handled 249 total boxes. The RC manger attended 1 RCB meeting. The RC staff executed 4 rush requests (information needed within 24hrs) and electronically distributed 146 pages of technical information. The RC shredded on-site 9 bins of confidential documentation. The RC performed 28 database/physical box searches which saved the delivery of 11 boxes. Research included: Permitting information for Army Corp. of Engineers (ACOE) waterway licenses, Metro West Water Supply Tunnel (MWWST) contracts, Wiggins Pump Station, Castle Island Pump Station, and Couburn Atlantic Gelatin property records.

IT Training: 17 staff attended 5 classes this quarter. To date, 3% of the workforce has attended at least one class this year. Security Awareness trainings session were held at Chelsea and Deer Island. Conflict of Interest training sessions were held at Chelsea. Completed 29 work orders and 4 incidents. One (1) job aid was developed/updated and posted on the Intranet (Pipeline).

Tunnel Redundancy: Created and configured a new internet-exposed network, called a "DMZ", that is shielded by the firewall and has limited access to the MWRA Internal Administrative network. Worked with FusionTek, the Tunnel Redundancy Project contractor, to ensure that network-based routing and addressing for the document management and sharing solution, Microsoft SharePoint, were implemented correctly.

Legal Matters
2nd Quarter FY 2020

PROJECT ASSISTANCE

Real Estate, Contract, Environmental and Other Support:

- **8(m) Permits:** Reviewed sixty-nine (69) 8(m) permits.
- **Real Property:** Prepared draft license for the Air Force Technical Applications Center for access to and use of certain designated areas at Deer Island. Drafted one-day license for entry to Oren Nichols House by the Southborough Historical Commission. Reviewed draft permit related to the use of MWRA's cell tower located at the Fells Reservoir for telecommunications equipment. Reviewed Quabbin Watershed Fee Acquisition, W-001220 for 117.8 acres in Shutesbury, MA, Wachusett Watershed Fee Acquisition, W-001221 for 46.05 acres in Princeton, MA, and Wachusett Watershed Fee Acquisition, W-001218 for 9.38 acres in Princeton, MA. Recorded certificates of compliance for orders of conditions for DEP 317-424 and 317-425 at the Hampshire County Registry of Deeds related to MWRA's fish hatchery project and MWRA's Quabbin Look Out Tower Security project in Ware, MA. Reviewed property rights for MWRA's Chicopee Valley Aqueduct (CVA) in the vicinity of 30 Bondsville Road in Ludlow, MA per the request of the landowner. Reviewed MWRA's property rights in Boston and Medford related to MWRA contract 7575 for low service PRV improvements. Reviewed MWRA's property interests in the area of Farwell Street in Newton, in the area of Charles Park Road in West Roxbury, in the area of Reservoir Lane in Newton, and for MWRA water main section 22 in Milton and Boston.
- **Boston Harbor Case:** Reviewed Semi-Annual Compliance and Progress Report.
- **Energy:** Reviewed interconnection service agreements with NGRID for the John Carroll Water Treatment Plant Solar PV and for the CVA Fish Hatchery Hydro Facility.
- **Miscellaneous:** Drafted summary of the Massachusetts law requiring the hands free use of mobile electronic devices by operators of motor vehicles.
- **Public Records Requests:** During the Second Quarter, MWRA received one hundred and thirty seven (137) public records requests and responded to one hundred and thirty-eight (138) public records requests.

LABOR, EMPLOYMENT AND ADMINISTRATIVE

New Matters

Three demands for arbitration were filed.

A union filed a charge of prohibited practice at the Massachusetts Department of Labor Relations alleging the MWRA violated Chapter 150E when it began deductions for paid medical and family leave under Chapter 175M.

Matters Concluded

Received an arbitrator's decision in favor of the union finding that the MWRA violated the collective bargaining agreement when it terminated an employee.

Settled two arbitration cases alleging MWRA violated a collective bargaining agreement when it did not reclassify an employee's job.

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

Received a probable cause determination from the MCAD of a charge on the basis of age, sexual orientation and retaliation.

LITIGATION/CLAIMS

New lawsuits/claims: MWRA v. Bharat Bhushan et al., C.A. No. 1984-CV-03586F: MWRA filed a Complaint for declaratory judgment and injunctive relief against Newton property owners who placed 90 cubic yards of fill on a portion of the Sudbury Aqueduct abutting their residential property. The Complaint alleges trespass and nuisance and seeks an order from the Court requiring the defendants to restore the affected portion of the Sudbury Aqueduct to its original condition and to enjoin them from any further encroachments onto the Sudbury Aqueduct land.

Significant Developments

J' D'Amico v. MWRA, et al.: Mediation session was held on October 25, 2019.

Shea v. MWRA: Day 1 of Plaintiff's deposition was taken in November 2019.

MWRA v. N.E.L. Corporation, Dewberry Engineers, et al.
Depositions of two MWRA employees were taken in December 2019.

Closed Cases: There are no closed cases.

Closed Claims: There are no closed claims.

Subpoenas During the 2nd Quarter of FY 2020, one subpoena was received and one subpoena was pending at the end of the Second Quarter FY 2020.

Wage Garnishments

There are currently 14 Trustee Process matters, only one of which is considered active and monitored by Law Division.

SUMMARY OF PENDING LITIGATION MATTERS

TYPE OF CASE/MATTER	As of Dec 2019	As of Sept 2019	As of June 2019
Construction/Contract/Bid Protest (other than BHP)	2	2	3
Tort/Labor/Employment	4	4	5
Environmental/Regulatory/Other	2	2	2
Eminent Domain/Real Estate	0	0	0
Total	8	8	10
Other Litigation matters (restraining orders, etc.)	1	1	1
Total – all pending lawsuits	9	9	11
Claims not in suit:	0	0	1
Bankruptcy	0	0	0
Wage Garnishment	1	4	4
TRAC/Adjudicatory Appeals	0	1	1
Subpoenas	1	0	0
TOTAL – ALL LITIGATION MATTERS	11	14	17

TRAC/MISC.

New Appeals: There are no new appeals in 2nd Quarter FY 2020.

Settlement by Agreement of Parties There are no Settlement by Agreement of Parties in 2nd Quarter FY 2020.

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 2nd Quarter FY 2020.

Final Decisions There are no Final Decisions issued in the 2nd Quarter FY 2020.

INTERNAL AUDIT AND CONTRACT AUDIT ACTIVITIES

2nd Quarter - FY20

Highlights

During 2nd quarter FY20, Internal Audit (IA) completed 2 incurred cost audits, Stantec and SAR Engineering. IA also completed 3 consultant preliminary reviews and 1 construction labor burden review.

Management advisory services included a report on CORI and background checks, Bay State Fertilizer 2019 financial results and investigation support. Work continues on verifying HEEC costs on the new Deer Island electric cable and on large equipment inspections.

Status of Recommendations

During FY20, 27 recommendations were closed of which 21 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 36 months, the appropriateness of the recommendation is re-evaluated.

All Open Recommendations Pending Implementation – Aging Between 0 and 36 Months

Report Title (issue date)	Audit Recommendations		
	Open	Closed	Total
Review of Uniform Debit Card Program (3/30/18)	1	5	6
Fleet Services Process Review (6/30/18)	1	4	5
Fuel Use & Mileage Tracking (12/31/18)	3	5	8
Review of Purchase Card Activity (5/23/19)	1	10	11
Asset Tracking – Fleet Data Verification (8/21/19)	<u>10</u>	<u>6</u>	<u>16</u>
Total Recommendations	16	30	46

Cost Savings

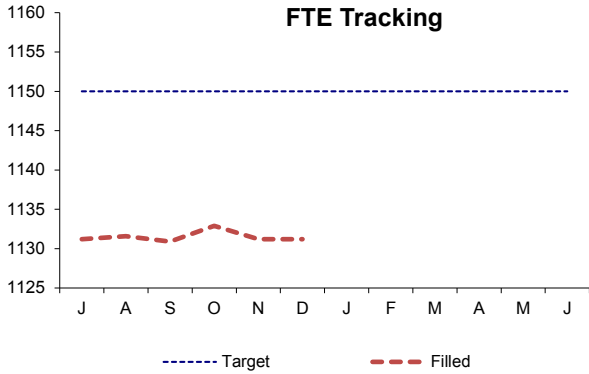
IA's target is to achieve at least \$1,000,000 in cost savings each year. Cost savings vary each year based upon many factors. In some cases, cost savings for one year may be the result of prior years' audits.

Cost Savings	FY16	FY17	FY18	FY19	FY20 Q2	TOTALS
Consultants	\$88,312	\$272,431	\$118,782	\$262,384	\$608,146	\$1,350,055
Contractors & Vendors	\$1,772,422	\$3,037,712	\$1,323,156	\$3,156,524	\$1,199,548	\$10,489,362
Internal Audits	\$220,929	\$224,178	\$204,202	\$210,063	\$106,634	\$966,006
Total	\$2,081,663	\$3,534,321	\$1,646,140	\$3,628,971	\$1,914,328	\$12,805,423

OTHER MANAGEMENT

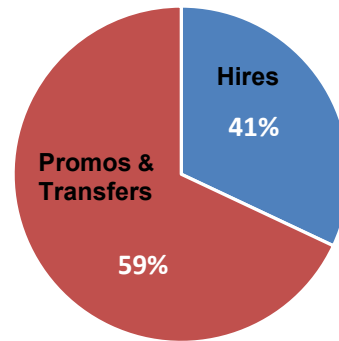
Workforce Management

2nd Quarter - FY20



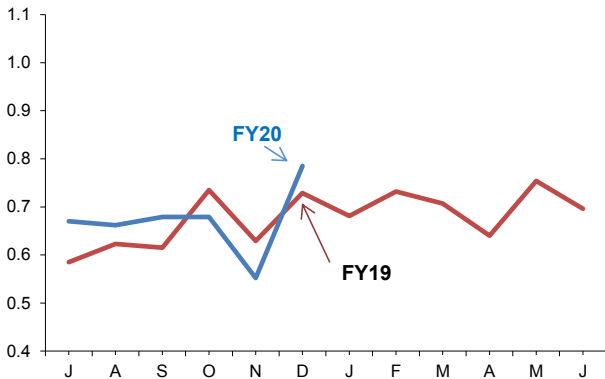
FY20 Target for FTE's = 1150
 FTE's as of December 2019 = 1131.2
 Tunnel Redundancy as of Dec 2019 = 7.0

Position Filled by Hires/Promos & Transfer for YTD



	Pr/Trns	Hires	Total
FY18	118 (61%)	74 (39%)	192
FY19	112 (60%)	76 (40%)	188
FY20	58 (59%)	40 (41%)	98

Average Monthly Sick Leave Usage Per Employee



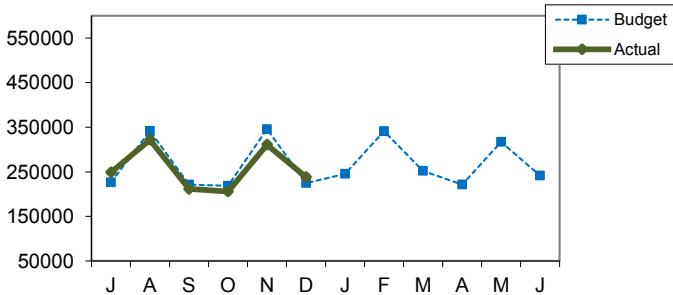
Average monthly sick leave for the 2nd Quarter of FY20 increased as compared to the 1st Quarter of FY19 (8.05 to 7.83)

MWRA Average Cumulative Sick Leave Use By Division Per Employee

	Number of Employees	YTD	Annualized Total	Annual FMLA %	FY19
Admin	138	3.57	7.14	26.6%	7.78
Aff. Action	5	5.26	10.53	10.3%	6.28
Executive	4	0.85	1.70	2.7%	7.05
Finance	32	2.76	5.51	0.0%	2.28
Int. Audit	6	3.35	6.69	16.2%	4.06
Law	12	3.24	6.48	12.5%	7.80
OEP	4	1.00	2.00	0.0%	5.97
Operations	930	4.16	8.32	22.3%	8.35
Tunnel Red	7	2.80	5.60	45.0%	8.11
Pub. Affs.	11	5.60	11.19	63.3%	4.45
MWRA Avg	1149	1.34	8.05	22.9%	8.13

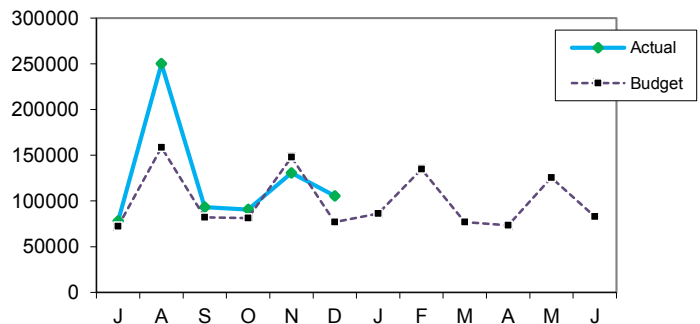
Percent of sick leave usage for FY20, attributable to Family and Medical Leave Act (FMLA) is 22.9% .

Field Operations Current Month Overtime \$



Total Overtime for Field Operations for the second quarter of 2020 was \$755k which is (\$34k) under budget. Emergency overtime was \$294k, which was (\$112k) under budget. Rain events totaled \$199k, CSO activation was \$9k, emergency maintenance was \$29.5k. Coverage overtime was \$149k, which was \$9k over budget, reflecting the month's shift coverage requirements. Planned overtime was \$312k or \$69k over budget, mainly for maintenance off-hours work at \$107k, community assistance (mainly quench buggy) at \$20k, and maintenance work completion at \$20k. Year-to-date, FOD has spent \$1.5m on overtime, which is (\$65k) under budget.

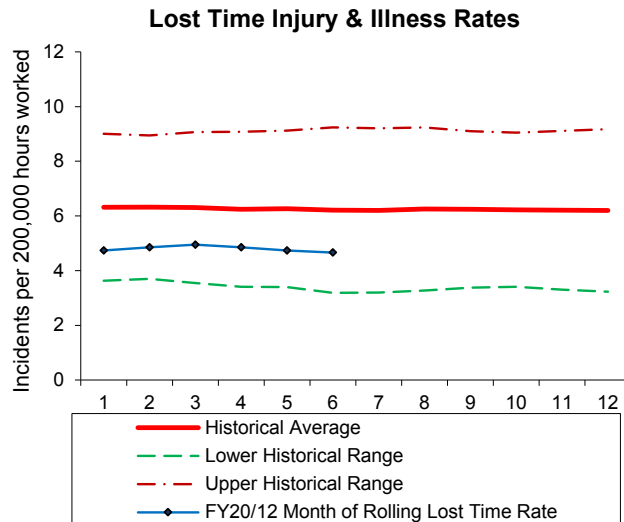
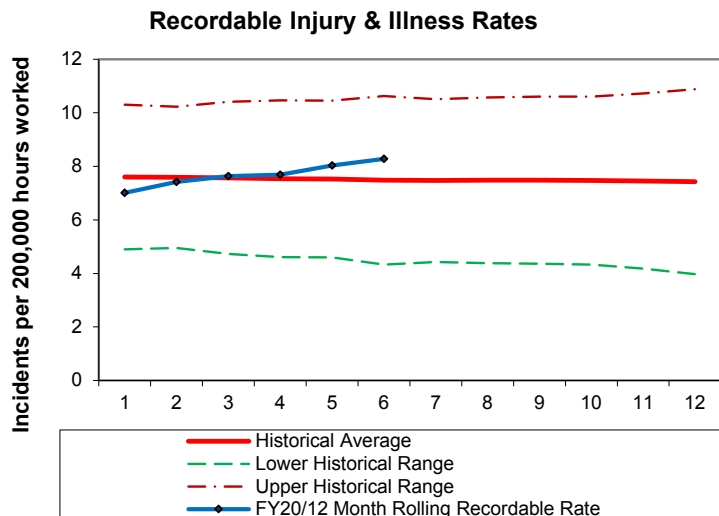
Deer Island Treatment Plant Current Month Overtime \$



Deer Island's total overtime expenditure for the second quarter was \$327k, which was \$21K or 7% over budget. In the second quarter Deer Island experienced higher than anticipated shift coverage requirements of \$22K and planned/unplanned overtime of \$15K. This is offset by less storm coverage of (\$17k). YTD Deer Island's overtime spending is \$748k which is \$129k or 21% over budget due to higher spending related to the HEEC cable outage of \$110k and shift coverage \$61k, offset by lower spending on storm coverage of (\$38K) and planned/unplanned overtime (non-HEEC related) of (\$4k). The FY20 CEB included \$30k for HEEC overtime vs. \$140k spent. The outage lasted 18 days as opposed to the 5 days anticipated.

Workplace Safety

2nd Quarter - FY20



- 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

	2nd Quarter Information		Open Claims
	New	Closed	
Lost Time	3	18	45
Medical Only	15	27	19
Report Only	18	18	
	QYTD		FYTD
Regular Duty Returns	7		14
Light Duty Returns	1		1
Indemnity payments as of Dec 30 2019 included in open claims listed			15

COMMENTS:

Regular Duty Returns

OCT 3 Employees returned to full duty/no restrictions
NOV 3 Employees returned to full duty/no restrictions
DECEMBER 1 Employees returned to full duty/no restrictions

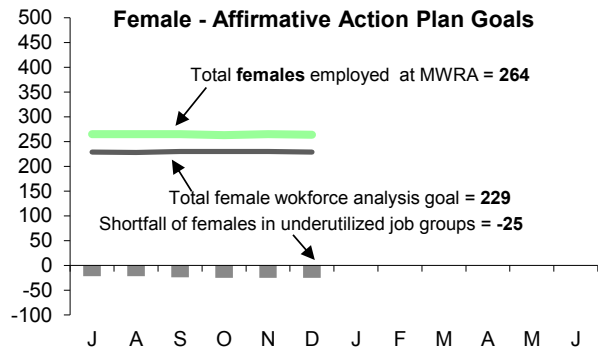
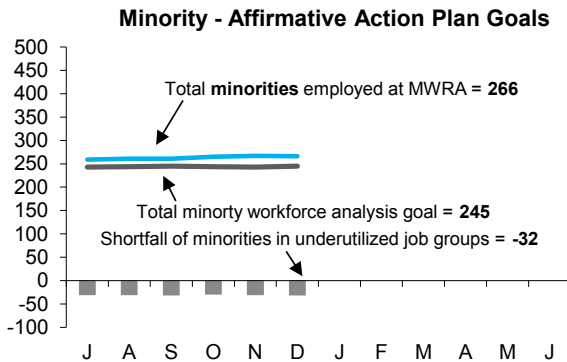
Light Duty Returns

OCT 1 Light Duty Return
NOV & DEC N/A

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

MWRA Job Group Representation

2nd Quarter - FY20



Highlights:

At the end of Q2 FY20, 6 job groups or a total of 32 positions are underutilized by minorities as compared to 7 job groups for a total of 71 positions at the end of Q2 FY19; for females 7 job groups or a total of 25 positions are underutilized females as compared to 8 job groups or a total of 53 positions at the end of Q2 FY19. During Q2, 12 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	Minorities	Achievement	Minority	Females	Achievement	Female
	as of 12/31/2019	as of 12/31/2019	Level	Over or Under Underutilized	As of 12/31/2019	Level	Over or Under Underutilized
Administrator A	23	3	3	0	11	7	4
Administrator B	22	0	4	-4	6	5	1
Clerical A	27	11	6	5	24	17	7
Clerical B	25	9	5	4	5	10	-5
Engineer A	81	26	17	9	16	19	-3
Engineer B	63	22	14	8	16	12	4
Craft A	117	15	23	-8	0	3	-3
Craft B	146	22	28	-6	3	7	-4
Laborer	68	22	15	7	4	3	1
Management A	100	23	24	-1	34	39	-5
Management B	43	9	9	0	9	5	4
Operator A	65	4	13	-9	2	1	1
Operator B	66	18	10	8	3	1	2
Professional A	29	3	7	-4	19	14	5
Professional B	163	47	43	4	79	60	19
Para Professional	53	16	11	5	26	14	12
Technical A	52	14	12	2	7	11	-4
Technical B	6	2	1	1	0	1	-1
Total	1149	266	245	53/-32	264	229	60/-25

AACU Candidate Referrals for Underutilized Positions

Job Group	Title	# of Vac	Requisition / Ext.	Int. / Ext.	Promotions/Transfers	AACU Ref. External	Position Status
Administrative B	Associate General Counsel	1	Ext.		0	0	NH = WF
Clerical B	Warehouse Materials Handler	3	Ext.		0	0	NH = (2WM) (HM)
Clerical B	Inventory Control Specialist	2	Int.		2	0	Promo = (HM) (WM)
Engineer A	Program Manager SCADA (Eng)	1	Int/Ext.		1	0	Promo = WM
Engineer A	Project Engineer	1	Int/Ext.		1	0	Promo = BM
Engineer A	Program Manager, Metro Meter Maint	1	Int.		1	0	Promo = WM
Craft A	M&O Specialist	2	Int/Ext.		2	0	Promo = 2WM
Craft A	WSS Foreman	2	Int.		2	0	Promo = 2WM
Craft B	Third Class Engineer	1	Ext.		0	0	NH = WM
Craft B	Specialty Valve Installer	2	Int.		2	0	Promo = 2WM
Craft B	Motor Equipment Repairman	1	Ext.		0	0	NH = WM
Craft B	Construction Pipelayer	1	Int.		1	0	Promo = WM
Craft B	Electrician	1	Ext.		0	0	NH = WM
Management A	Senior Program Manager (DISC)	1	Int/Ext.		1	0	Promo = BF
Management A	Manager, Wastewater Ops.	1	Int.		1	0	Promo = WM
Operators A	Sr. Transmission & Treatment Oper.	1	Int.		1	0	Promo = WM
Operators A	Area Supervisor	1	Int.		1	0	Promo = WM
Operators A	Supervisor, Inspection	1	Int.		1	0	Promo = WM
Professional A	Senior Staff Counsel	1	Ext.		0	0	NH = WF
Technical A	Business Systems Analyst III	1	Int.		1	0	Promo = WM
Technical A	Sr. Field Service Technician	2	Ext.		0	0	NH = 2WM

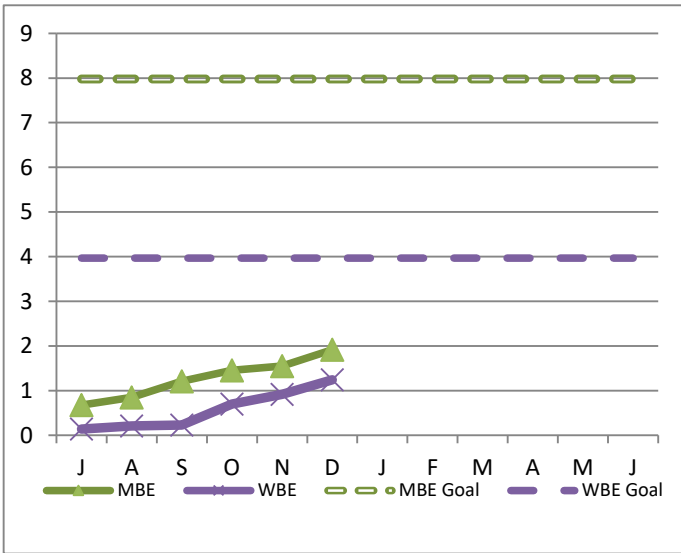
MBE/WBE Expenditures

2nd Quarter - FY20

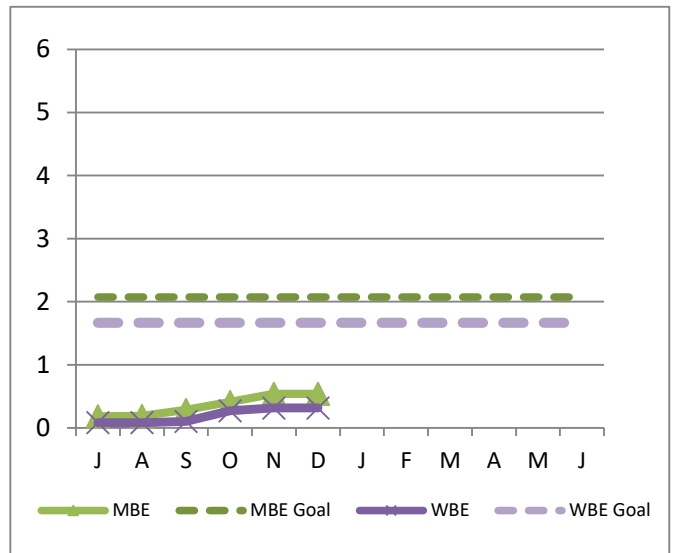
MBE/WBE targets are determined based on annual MWRA expenditure forecasts in the procurement categories noted below. The goals for FY20 are based on 85% of the total construction and 75% of the total professional projected spending for the year. Certain projects have been excluded from the goals as they have no MBE/WBE spending goals.

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

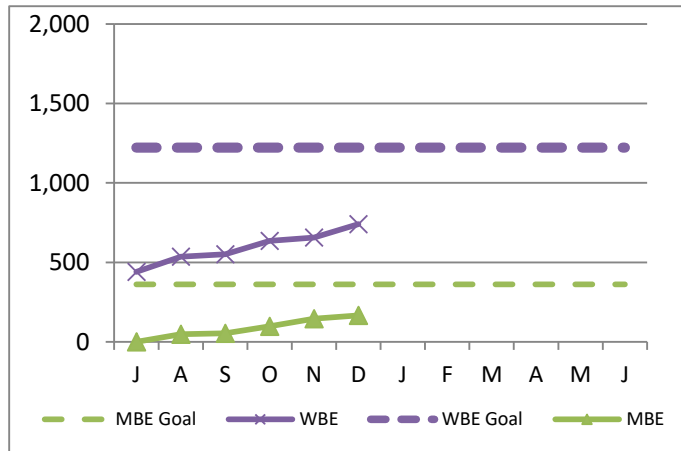
Construction



Professional Services



Goods/Services



FY20 spending and percentage of goals achieved, as well as FY19 performance are as follows:

MBE					WBE			
FY20 YTD		FY19			FY20 YTD		FY19	
Amount	Percent	Amount	Percent		Amount	Percent	Amount	Percent
1,914,688	24.0%	11,699,641	150.6%	Construction	1,241,634	31.3%	20,152,509	521.8%
540,271	26.0%	2,285,171	134.1%	Prof Svcs	317,162	19.0%	1,551,120	113.2%
166,429	46.0%	213,198	40.3%	Goods/Svcs	740,802	60.6%	780,760	46.7%
2,621,388	25.2%	14,198,010	142.0%	Totals	2,299,598	33.5%	22,484,389	325.6%

FY20 MBE/WBE dollar totals do not include MBE and WBE payments to prime contractors and consultants.

MWRA FY20 CEB Expenses 2nd Quarter – FY20

As of December 2019, total expenses are \$368.0 million, \$8.6 million or 2.3% lower than budget, and total revenue is \$398.9 million, \$1.9 million or 0.5% over budget, for a net variance of \$10.5 million.

Expenses –

Direct Expenses are \$117.4 million, \$5.1 million or 4.1% under budget.

- **Wages & Salaries** are under budget by \$2.0 million or 3.8%. Regular pay is \$2.1 million under budget, due to lower head count, and timing of backfilling positions. YTD through December, the average Full Time Equivalent (FTE) positions was 1,138, twenty fewer than the 1,158 FTE's budgeted.
- **Ongoing Maintenance** expense \$1.2 million or 7.1% under budget due to the actual timing of projects.
- **Professional Services** expenses are \$928k under budget or 20.8%, primarily due to under spending for Computer System Consultants of \$621k and \$169k underspending on Other Professional Services, including Finance and Law, partially offset by overspending of \$134k for Lab & Testing & Analysis.
- **Fringe Benefit** expenses are \$410k under budget or 3.9%, primarily due to under spending for Health Insurance of \$324k, driven by lower headcount.
- **Worker's Compensation** expenses are \$416k under budget or 35.4%, reflecting lower compensation payments of \$305k, medical payments of \$80k, and administrative expenses of \$31k.
- **Chemical** expenses are \$309k under budget or 4.8%, primarily due to lower than budget spending on Soda Ash at Carroll Water Treatment Plant and Clinton Plant of \$195k and lower Activated Carbon of \$188k is driven by DITP of \$156k due to lower than expected cost. The Deer Island Wastewater Treatment Plant flows are 1.6% higher than the budget and the Carroll Water Treatment Plant flows are 4% less than the budget through December. Higher flows at Deer Island resulted in increased sodium bisulfate usage which was \$135k over budget. Timing of deliveries is an important factor in chemical spending.
- **Utilities** are \$261k over budget or 2.2% as overspending on diesel \$743k for CTG usage at Deer Island during HEEC cable electrification and December fuel delivery was only partially offset by lower electricity spending of \$561k as CTG usage reduced electricity spending by \$248K at Deer Island and lower interval pricing contributed to the remaining negative electricity variance.
- **Other Materials** expenses are \$230k under budget or 8.9%, primarily due to underspending on computer hardware of \$357k in MIS and vehicle purchases/replacements of \$122k due to timing.

Indirect Expenses are \$21.5 million, \$3.5 million or 14.1% under budget driven by lower than expected Watershed Reimbursement of \$3.5 million due to lower costs associated with fringe benefits, compensation, equipment, major projects, and prior period adjustments.

Debt Service Expenses totaled \$229.0 million, right on budget, after \$5.0 million year-to-date savings was transferred to the defeasance account. The savings is the result of lower than budgeted variable rates and refunding savings.

Revenue and Income –

Total Revenue and Income is \$398.9 million or \$1.9 million higher than budget primarily due to greater than budgeted other user charges of \$0.9 million driven by Stoughton's prepayment of its remaining Entrance Fee, disposal of equipment of \$257k, higher interest income of \$203k, RPS energy revenue of \$183k due to timing, and receipt of an unbudgeted operating grant for \$106k.

	Dec 2019 Year-to-Date			
	Period 6 YTD Budget	Period 6 YTD Actual	Period 6 YTD Variance	%
EXPENSES				
WAGES AND SALARIES	\$ 52,752,880	\$ 50,732,705	\$ (2,020,175)	-3.8%
OVERTIME	2,461,744	2,613,360	151,616	6.2%
FRINGE BENEFITS	10,642,977	10,232,647	(410,330)	-3.9%
WORKERS' COMPENSATION	1,177,128	760,729	(416,399)	-35.4%
CHEMICALS	6,438,332	6,128,834	(309,498)	-4.8%
ENERGY AND UTILITIES	11,997,847	12,258,993	261,146	2.2%
MAINTENANCE	17,087,171	15,875,827	(1,211,344)	-7.1%
TRAINING AND MEETINGS	261,685	181,928	(79,757)	-30.5%
PROFESSIONAL SERVICES	4,453,032	3,524,945	(928,087)	-20.8%
OTHER MATERIALS	2,572,695	2,342,604	(230,091)	-8.9%
OTHER SERVICES	12,616,271	12,732,635	116,364	0.9%
TOTAL DIRECT EXPENSES	\$ 122,461,762	\$ 117,385,207	\$ (5,076,556)	-4.1%
INSURANCE	\$ 1,305,611	\$ 1,230,136	\$ (75,475)	-5.8%
WATERSHED/PILOT	13,416,800	9,964,013	(3,452,787)	-25.7%
HEEC PAYMENT	1,155,631	1,155,630	(1)	0.0%
MITIGATION	827,309	825,534	(1,775)	-0.2%
ADDITIONS TO RESERVES	1,047,142	1,047,142	-	0.0%
RETIREMENT FUND	7,315,000	7,315,000	-	0.0%
POST EMPLOYEE BENEFITS	-	-	-	---
TOTAL INDIRECT EXPENSES	\$ 25,067,493	\$ 21,537,455	\$ (3,530,038)	-14.1%
STATE REVOLVING FUND	\$ 43,837,982	\$ 43,741,190	\$ (96,792)	-0.2%
SENIOR DEBT	98,596,887	103,640,896	5,044,009	5.1%
DEBT SERVICE ASSISTANCE	(890,235)	(890,235)	-	0.0%
CURRENT REVENUE/CAPITAL	-	-	-	---
SUBORDINATE MWRA DEBT	85,877,606	79,856,604	(6,021,002)	-7.0%
LOCAL WATER PIPELINE CP	-	-	-	---
CAPITAL LEASE	1,608,530	1,608,530	-	0.0%
DEBT PREPAYMENT	-	-	-	---
VARIABLE DEBT	-	(3,901,462)	(3,901,462)	---
DEFEASANCE ACCOUNT	-	4,975,246	4,975,246	---
TOTAL DEBT SERVICE	\$ 229,030,769	\$ 229,030,769	\$ -	0.0%
TOTAL EXPENSES	\$ 376,560,024	\$ 367,953,431	\$ (8,606,594)	-2.3%
REVENUE & INCOME				
RATE REVENUE	\$ 380,883,500	\$ 380,883,500	\$ -	0.0%
OTHER USER CHARGES	4,288,236	5,236,629	948,393	22.1%
OTHER REVENUE	4,161,344	4,951,838	790,494	19.0%
RATE STABILIZATION	-	-	-	---
INVESTMENT INCOME	7,605,377	7,808,459	203,082	2.7%
TOTAL REVENUE & INCOME	\$ 396,938,457	\$ 398,880,426	\$ 1,941,969	0.5%

Cost of Debt 2nd Quarter – FY20

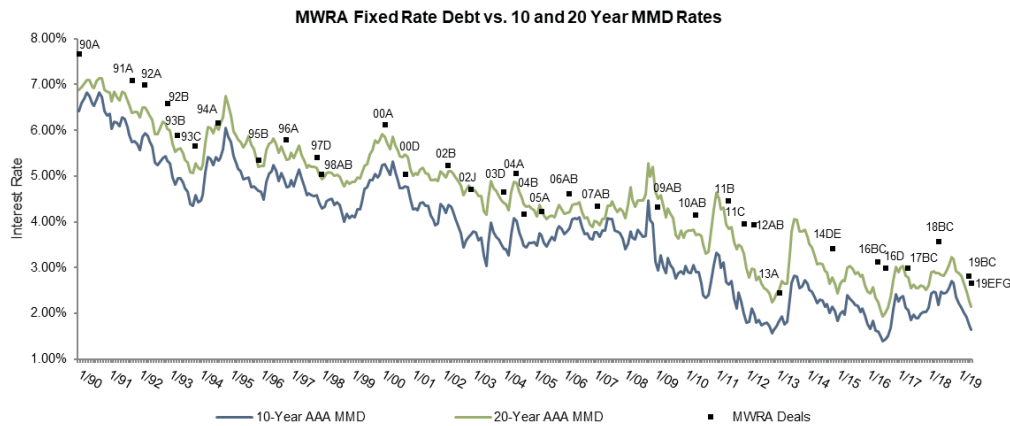
MWRA borrowing costs are a function of the fixed and variable tax exempt interest rate environment, the level of MWRA's variable interest rate exposure and the perceived creditworthiness of MWRA. Each of these factors has contributed to decreased MWRA borrowing costs since 1990.

Average Cost of MWRA Debt FYTD

Fixed Debt (\$3.49 billion)	3.47%
Variable Debt (\$354.8 million)	1.84%
SRF Debt (\$921.4 million)	1.55%
Weighted Average Debt Cost (\$4.94 billion)	2.97%

Most Recent Senior Fixed Debt Issue May 2019

2019 Series E, F & G (\$620.6 million) 2.66 %

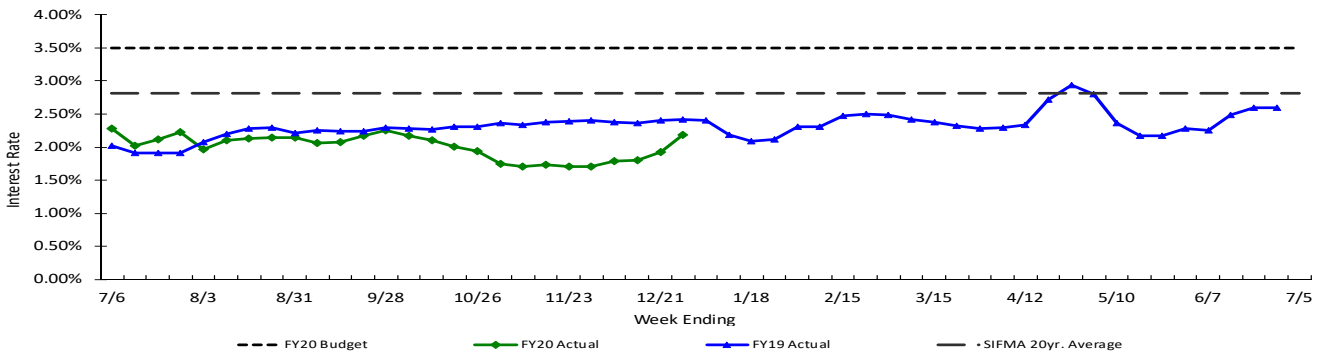


Bond Deal	1994A	1995B	1996A	1997D	1998AB	2000A	2000D	2002B	2002J	2003D	2004A	2004B	2005A	2006AB
Rate	6.15%	5.34%	5.78%	5.40%	5.04%	6.11%	5.03%	5.23%	4.71%	4.64%	5.05%	4.17%	4.22%	4.61%
Avg Life	19.5 yrs	20.5 yrs	19.5 yrs	21.6 yrs	24.4 yrs	26.3 yrs	9.8 yrs	19.9 yrs	19.6 yrs	18.4 yrs	19.6 yrs	13.5 yrs	18.4 yrs	25.9 yrs

Bond Deal	2007AB	2009AB	2010AB	2011B	2011C	2012AB	2013A	2014D-F	2016BC	2016D	2017BC	2018BC	2019BC	2019EFG
Rate	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%	2.66%
Avg Life	24.4 yrs	15.4 yrs	16.4 yrs	18.8 yrs	16.5 yrs	17.9 yrs	9.9 yrs	15.1 yrs	17.4 yrs	18.8 yrs	11.2 yrs	11.7 yrs	11.9 yrs	9.73 yrs.

Weekly Average Variable Interest Rates vs. Budget

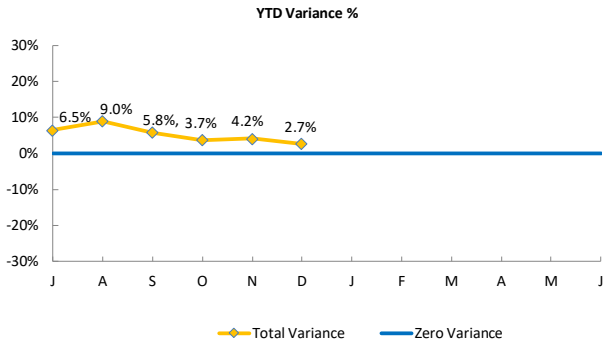
MWRA currently has ten variable rate debt issues with \$782.2 million outstanding, excluding commercial paper. Of the ten outstanding series, four have portions which have been swapped to fixed rate. Variable rate debt has been less expensive than fixed rate debt in recent years as short-term rates have remained lower than long-term rates on MWRA debt issues. In December, SIFMA rates ranged from a high of 1.61% to a low of 1.11% 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.



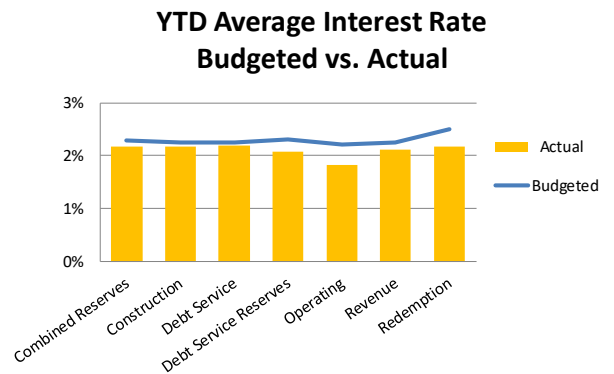
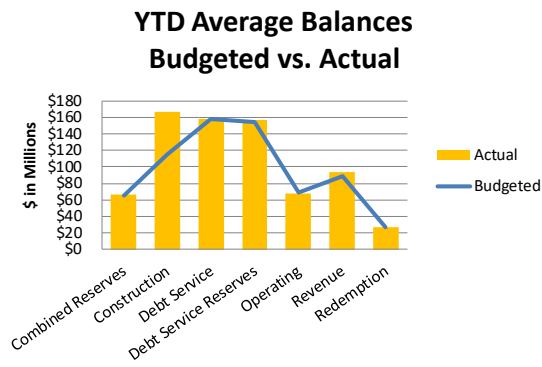
Investment Income

2nd Quarter – FY20

Year To Date



	YTD BUDGET VARIANCE			
	(\$'000)			
	BALANCES IMPACT	RATES IMPACT	TOTAL	%
Combined Reserves	\$16	(\$36)	(20)	-2.7%
Construction	\$588	(\$70)	518	40.6%
Debt Service	\$8	(\$40)	(32)	-1.8%
Debt Service Reserves	\$32	(\$183)	(152)	-8.6%
Operating	(\$12)	(\$59)	(71)	-9.4%
Revenue	\$61	(\$65)	(4)	-0.4%
Redemption	\$7	(\$44)	(37)	-11.3%
Total Variance	\$700	(\$497)	\$203	2.7%



Monthly

