

STAFF SUMMARY


TO: Board of Directors
FROM: Frederick A. Laskey, Executive Director
DATE: February 16, 2022
SUBJECT: FY2022 Second Quarter Orange Notebook



COMMITTEE: Administration, Finance & Audit

INFORMATION
 VOTE

Carolyn M. Fiore, Deputy Chief Operating Officer
Stephen Estes-Smargiassi, Director, Planning & Sustainability
Preparer/Title



David W. Coppes, P.E.
Chief Operating Officer

RECOMMENDATION:

For information only. The Quarterly Report on Key Indicators of MWRA Performance (the Orange Notebook) is prepared at the close of each quarter of the fiscal year.

DISCUSSION:

The Orange Notebook presents performance indicators for operational, financial, workforce, and customer service parameters tracked by MWRA management each month. This staff summary includes highlights from both the First and Second Quarters, as the First Quarter Orange Notebook was not presented due to the cancelled November meeting.

Staffing

As discussed at previous Board meetings, high levels of staff turnover have continued, especially retirements, and hiring replacements has been particularly difficult, resulting in staffing levels below planned and budgeted levels. Staffing levels dropped below those seen at the end of the last fiscal year (1,130.7 FTEs) to 1,090.7 FTEs (full time equivalents) at the end of December compared to a target of 1150 FTEs. In the current highly competitive employment market, recruitment of staff continues to be difficult, with some positions attracting no qualified applicants requiring reposting and delaying replacements. Staff are developing new recruitment strategies, including the possible use of staffing agencies for high level positions, the continued development of long-term relationships with vocational technical schools, the possible creation of entry level positions in operations and the enhanced use of social media. (See page 42.)

A number of routine activities have been adversely affected by the reduced availability of staff. Examples of these include delays in replacements of blow-off valves (see page 7), issuance of Significant Industrial User (SIU) permits (see page 12), and several of the laboratory's performance measures (see page 15).

Looking forward to the Third Quarter, the next Orange Notebook will likely show some additional impacts during the beginning of the quarter due to the imposition of additional COVID safety protocols during the Omicron surge.

Wastewater Treatment Plant Flows

First Quarter wastewater flow to the Deer Island Wastewater Treatment Plant was 63 percent higher than the four-year average (414 actual vs. 263.9 expected million gallons per day) as precipitation was more than 2.5 times above expected (24.5 inches vs. 9.8 inches). The Deer Island plant set new high flow records in both July and September. Interestingly, Deer Island set low flow records during the first quarter of the prior fiscal year, as noted in the Orange Notebook report to the Board in November of last year. During the Second Quarter, flows were about on target. (See page 1.)

Higher precipitation and plant flows were also experienced at the Clinton Wastewater Treatment Plant with flow from Clinton and Lancaster in each month of the First Quarter substantially higher than the very low flows during the same period last year. This raised the 12-month rolling average up to 2.83 mgd, close to the NPDES permit limit of 3.01 mgd. While flows declined somewhat during the Second Quarter, the October and November flows were well above the previous year's flows during those months, resulting in the 12-month rolling annual average exceeding the NPDES permit limit for each month in the Second Quarter. (See page 28.)

Energy Costs at the Deer Island Treatment Plant

While flows decreased towards the end of the Second Quarter, higher influent flows than the budget target occurred four of the six months during the first two quarters increased power use for pumping. This, coupled with higher unit costs for electricity, resulted in electricity costs that are \$939,576 (30.9 percent) higher than the budget forecast for the first four months of the fiscal year. (See page 1.)

Drinking Water Use

The wet end to the seasonal irrigation season reduced drinking water use by communities during the first quarter by 26.5 mgd, a reduction of 11.8 percent below that same period the prior year during very dry conditions. Second Quarter use was similar to the previous two years. (See pages 26 and 29.) A more detailed review of 2021 water use is presented in a separate staff summary being presented at this meeting.

Drinking Water Quality

The very high levels of late summer precipitation proved challenging from a water quality perspective for the metro Boston drinking water system during the First Quarter and the early part of the Second Quarter. The impact was felt all the way from the Wachusett Reservoir, through the treatment process at Carroll Water Treatment Plant, and then out to the community distribution systems. The excess rain occurred during the summer period when MWRA is normally optimizing the flow of "well aged" Quabbin water to the Cosgrove Intake. Instead, the Carroll Plant received water that had higher than usual fresh "reactive" organic matter. This is measured by UV254, and those levels in Wachusett Reservoir were high for that time of year. (See page 20.)

This resulted in the need to add more chlorine at the Carroll Plant, but as the chlorine also breaks down more rapidly under these conditions, the decline continued throughout community distribution systems. While the chlorine dose was at the highest level since the plant started operation in 2005, there were still locations within community systems that had low chlorine

residuals. The widespread low chlorine levels and warm temperatures provided the opportunity for harmless total coliform bacteria to grow from the biofilm inside the pipes. (See page 24.) With the beginning of colder weather and decreasing water temperatures, the situation improved during November and December, as bacterial activity is significantly lower in cold temperatures, and chlorine decays more slowly. Staff provided technical assistance to communities that were required to conduct distribution system assessments under the Total Coliform Rule.

Staff issued a community advisory in early October on the lower residuals and held three informational technical webinars for community staff later in the month, as well as providing a briefing at the October Advisory Board Operations Committee meeting. Staff continue to evaluate the data and potential changes to system operations, and anticipate conducting additional technical training sessions for community staff early this spring.

MASSACHUSETTS WATER RESOURCES AUTHORITY

Board of Directors Report

on

Key Indicators of MWRA Performance

Second Quarter FY2022

Q1	Q2	Q3	Q4



Frederick A. Laskey, Executive Director
David Coppes, Chief Operating Officer
February 16, 2022

Board of Directors Report on Key Indicators of MWRA Performance

2nd Quarter FY22

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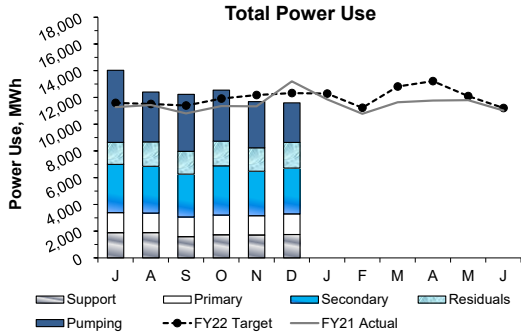
This quarterly report is prepared by MWRA staff to track a variety of MWRA performance measures for routine review by MWRA's board of directors. The content and format of this report is expected to develop as time passes. Information is reported on a preliminary basis as appropriate and available for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

Frederick A. Laskey, Executive Director
David Coppes, Chief Operating Officer
February 16, 2022

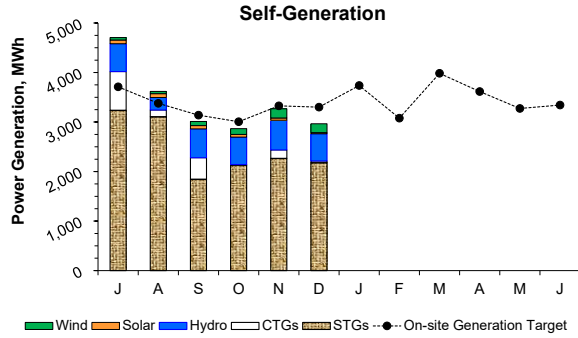
OPERATIONS AND MAINTENANCE

Deer Island Operations

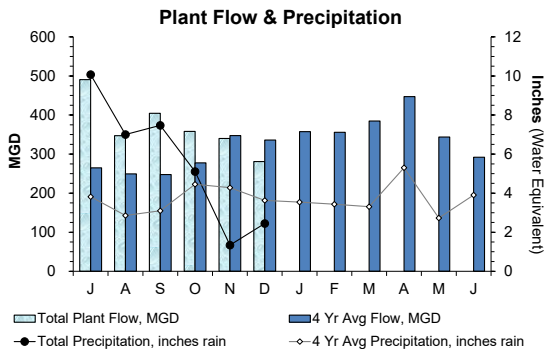
2nd Quarter - FY22



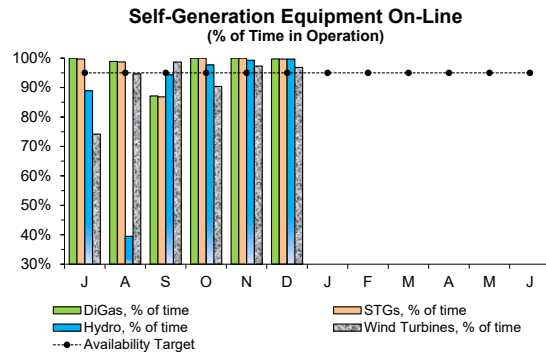
Total power usage in the 2nd Quarter was on target (-1.6%) as plant flow for this period was also on target (+1.9%) with historical data (4 year average) used to generate the electricity model. As a result, power usage for all treatment process areas were similar to or below target during the 2nd Quarter.



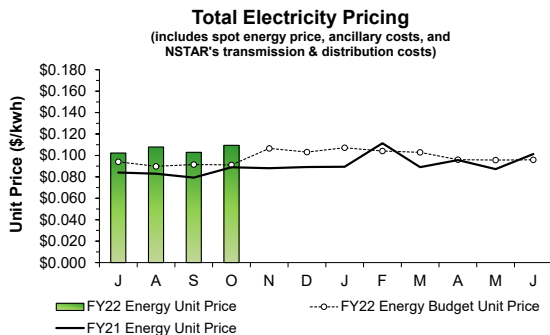
Power generated on-site during the 2nd Quarter was 5.5% below target. CTG generation was below target by 77.5% since there were no storms and high flow conditions during this quarter that met the criteria for CTG operation as had been included in the budget based on historical operation. The CTGs were operated for routine maintenance/checkout purposes, for an ISO-New England winter audit test event, and for nearly 15 hours on November 9 to allow Eversource to perform maintenance on the cross-harbor electrical cable. STGs generation was 5.4% below target as digester gas production was 7.9% below target. Hydro Turbine generation was 73.8% above target due to a budget estimate that was biased low. Wind Turbine generation was 19.5% below target even as turbine availability met the 95% target. Solar Panel generation was within 2.6% of the target.



Total Plant Flow for the 2nd Quarter was on target (+1.9%) with the budgeted 4 year average plant flow (326.3 MGD actual vs. 320.3 MGD expected) even though precipitation was 28.1% below target this quarter (8.90 inches actual vs. 12.37 inches expected). Plant flows remained elevated into the 2nd Quarter due to rainfall that was more than double the amount expected during the first four (4) months of FY22.

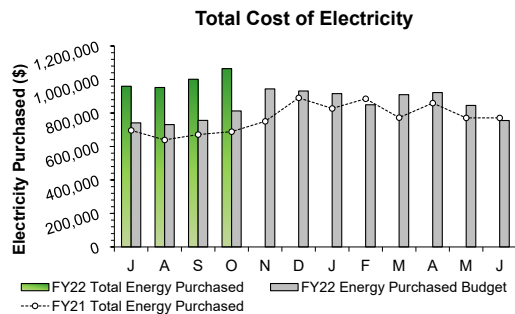


The DiGas System, STGs, Hydro Turbine, and Wind Turbine availability all met or exceeded the 95% availability in the 2nd Quarter.



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 October (the most current invoice available) was 20.1% above target with budgetary estimates. The actual Total Energy Unit Prices in November and December are not yet available as the complete invoices have not been received. The Total Energy Unit Price includes a fixed block price, spot energy price, transmission & distribution charges, and ancillary charges.

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



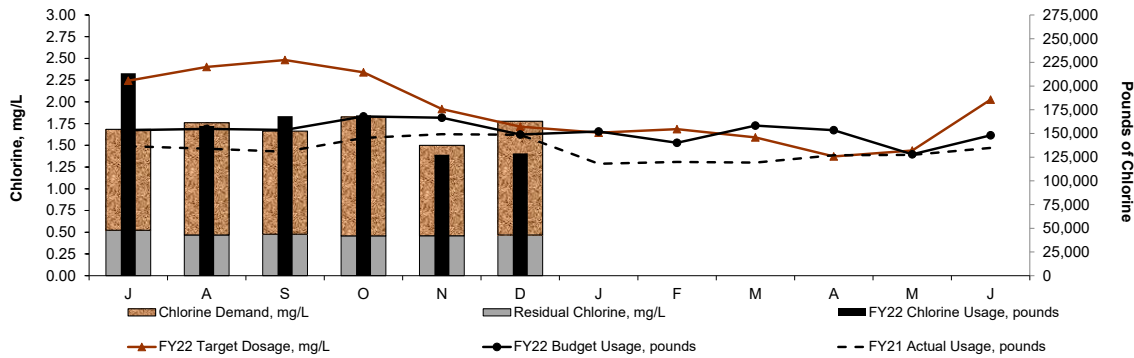
The Electricity cost data for Electricity Purchased for November and December are not yet available as the complete invoices have not been received. Year-to-date Total Cost of Electricity is \$939,576 (30.9%) higher than budgeted through October as the Total Energy Unit Price was 15.3% higher than target and the Total Electricity Purchased was 13.6% above target.

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

Deer Island Operations

2nd Quarter - FY22

Deer Island Sodium Hypochlorite Use



The disinfection dosing rate in the 2nd Quarter was 15.0% below target with budgetary estimates. Actual sodium hypochlorite usage in pounds of chlorine was 12.0% lower-than-expected even though the average plant flow was on target (+1.9%). DITP maintained an average disinfection chlorine residual of 0.46 mg/L this quarter with an average dosing rate of 1.70 mg/L (as chlorine demand was 1.24 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	7	7	0	95.1%	84.65
A	6	6	0	99.0%	17.42
S	2	2	0	96.4%	35.02
O	5	5	0	99.3%	16.48
N	1	1	0	99.9%	2.41
D	0	0	0	100.0%	0.00
J					
F					
M					
A					
M					
J					
Total	21	21	0	98.0%	155.97

99.7% of all flows were treated at full secondary during the 2nd Quarter. There were six (6) secondary blending events due to high plant flows from heavy precipitation. These blending events resulted in 18.89 hours of blending and a total of 89.44 MGal of primary-only treated effluent blended with secondary effluent. The Maximum Secondary Capacity during the entire quarter was 700 MGD. Secondary permit limits were met at all times during the 2nd Quarter of FY22.

Deer Island Operations & Maintenance Report

Environmental/Pumping:

The plant achieved an instantaneous peak flow rate of 1,031.1 MGD in the 2nd Quarter during the evening on October 30. This peak flow occurred during a storm event that brought 4.23 inches of precipitation to the metropolitan Boston area. Overall, Total Plant Flow in the 2nd Quarter was 1.9% above target with the 4 year average plant flow estimate for the quarter.

On September 16, staff discovered a significant leak due to corrosion in the pump head just below the volute on raw wastewater Pump #5 in the Winthrop Terminal Headworks Facility. DITP maintenance staff found two (2) holes in the volute near the pump head. Repairs to the pump were completed by staff on October 19 and the pump was reinstalled by October 22. However, some leakage around the mechanical seal was observed during pump testing indicating the seal was in need of replacement which often occurs as a result of the pump being physically removed for maintenance work. The mechanical seal was replaced by the seal provider on November 8 which corrected the issue with the leak.

Secondary Treatment:

Annual turnaround maintenance was performed on Train #1 in the Cryogenic Oxygen Facility in 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).

Odor Control Treatment:

Carbon adsorber (CAD) units #1 and #4 in the North Pumping Odor Control (NPOC) Facility, #5 in the Residual Odor Control (ROC) Facility, and #1 and #2 in the Secondary Odor Control (SOC) Facility were emptied and refilled with regenerated activated carbon media in the 2nd Quarter as part of routine maintenance to replace spent activated carbon.

Deer Island Operations

2nd Quarter - FY22

Deer Island Operations & Maintenance Report (continued)

Residuals Treatment:

On October 25, Module #1 Digester #4 developed a leak on the far side of the lower feed ring line at a Victaulic flange. This digester was immediately taken out of service and drained to allow repairs to be made. The failed flange and several other feed ring valves were replaced in early November. While the digester was offline and empty, an inspection revealed the draft tube mixer had extensive corrosion. A crane was mobilized and the mixer was replaced by staff on November 19. The process of refilling the digester with sludge by diverting the sludge overflows from the other online digesters in Module #1 began immediately after the mixer replacement was completed and normal sludge feed to this digester resumed on November 29 returning DITP to eight (8) digester operation.

Energy and Thermal Power Plant:

Overall, total power generated on-site accounted for 25.4% of Deer Island's total power use for the 2nd Quarter. Renewable power generated on-site (by Solar, Wind, STGs, and Hydro Turbines) accounted for 24.8% of Deer Island's total electrical power use for the quarter.

DITP took delivery of 430,000 gallons of #2 fuel oil, a total of 43 oil tanker trucks, without incident from October 5 through October 15. 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.

High winds during the October 26-27 nor'easter storm event caused damage to several pieces of equipment at DITP including a portion of the solar panel array on the rooftop of the Residuals Odor Control (ROC) Facility which disabled the ability of this array to generate electricity for the remainder of the month. Inspections revealed that 40 out of the 525 solar panels in this array and parts of the supporting structure were damaged. Staff were able to electrically bypass the damaged portion of the ROC solar array on November 3 to restore electricity generation from the remaining viable portions of the array.

The CTGs were operated for nearly 15 hours on November 9 while DITP was disconnected from utility power. The cross-harbor power cable was de-energized during this time to allow Eversource to perform scheduled maintenance on the cross-harbor electrical cable and the equipment at their Station 132 on DITP. The CTGs were successfully able during this Eversource outage to provide the power needs for DITP. Electrical and additional Operations staff were onsite prior to and after the Eversource outage to support this work and in the event of an unanticipated power issue.

CTG-1A was operated for approximately two (2) hours on December 8 for an ISO-New England declared Demand Response winter audit event.

Routine annual maintenance and inspections were conducted on CTG-2B during the week of December 13. This year's maintenance included invasive work as the scope included a generator bearing inspection which required the removal of the generator covers and instrumentation. Therefore, the amount of time required to return the CTG to service in the event of an emergency would be slightly longer than two (2) hours. CTG-1A, however, was available for operation during this work. The maintenance also included non-invasive inspections, instrument calibrations and system checks. CTG-2B was successfully test operated at the end of the week on December 17 after the annual maintenance work was completed. Similar maintenance will be conducted on CTG-1A in the near future but without the bearing inspection since the inspection is not yet due for this CTG.

Other:

Congresswoman and Assistant House Speaker Katherine Clark toured the Deer Island Treatment Plant on December 7 and held a press event to help promote the clean water infrastructure provisions in the recently signed Infrastructure Investment and Jobs Act. Massachusetts is slated to receive about \$12.5 billion, with just over \$1 billion dedicated to improving water infrastructure.

Clinton Operations & Maintenance Report

Dewatering Building:

Maintenance staff installed a new hydraulic cylinder on belt filter press sludge hopper. Staff also installed a new 2" water valve on #1 belt filter press. They also changed out 3 circulator pumps in dewatering boiler room they were pump # P-3, P-4, and P-5. Operations staff unblocked # 1 gravity thickener scum well and washed down the gravity thickener weirs.

Chemical Building:

Maintenance staff removed and replaced a flange on the Returned Activated Sludge (RAS) piping to drain the header for the contractor valve & pipe replacement project. The contractor has now completed the valve and piping project in the lower chemical building. Maintenance performed laser alignment on #1 RAS pump. Deer Island staff installed a VFD controller on the #1 hypochlorite pump and they also installed a new # 2 hypochlorite pump. Deer Island staff also completed the sodium hypochlorite piping project in the chemical building. Operations staff cleaned the #1 and #2 polymer pumps for the winter shut down period. Maintenance staff installed a new mixing shaft for the soda ash mixing tank and also replaced a worn soda ash feed belt. The plumbing contractor installed a new condensate pump.

Aeration Basins:

Operations staff cleaned the pH and D.O. probes. Maintenance staff replaced Aerzen blower # 6A. Facilities specialist continues to repair concrete and expansion joints.

Phosphorus Building:

Maintenance staff acid washed all three (3) disk filters, cleaned the troughs, and inspected all nozzles. Operation staff cleaned both CL17 chlorine analyzers. The Phosphorus Reduction Facility (PRF) was taken off line and all tanks and channels were drained and washed down. The building is now winterize.

Headworks:

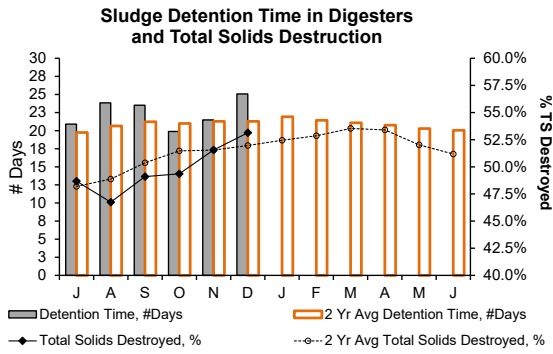
Operations staff put #1 grit chamber on line. Staff moved diesel hydraulic pump from the intermediate lift station to the influent lift station. Maintenance staff also cleaned the influent and mechanical bar rack, and greased the upper and lower pin rack. They replaced both sampler lines and installed heat trace on the influent Lab samplers. Staff rebuilt primary pump # 2. Maintenance staff and the contractor installed EXP motor on the grit rake system. The contractor completed welding of 30 large patches on the # 2 grit classifier. Also a plumbing contractor replaced the headworks' boiler condensate float and a malfunctioning flow switch for the Lab eyewash stations.

Digester Building:

Maintenance staff checked all equipment for proper operation. They also greased the Ovivo mixer on the floating cover.

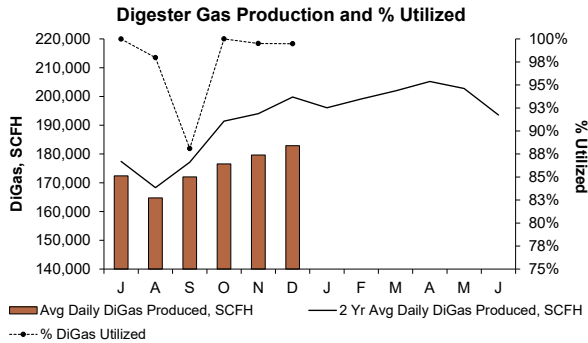
Deer Island Operations and Residuals

2nd Quarter - FY22



Total solids (TS) destruction following anaerobic sludge digestion averaged 51.4% during the 2nd Quarter, on target with the 2 year average of 51.7%. Sludge detention time in the digesters was 22.1 days, 4.5% above target, even though 7.4 digesters were in operation in comparison to the 6 year average of 7.9 digesters.

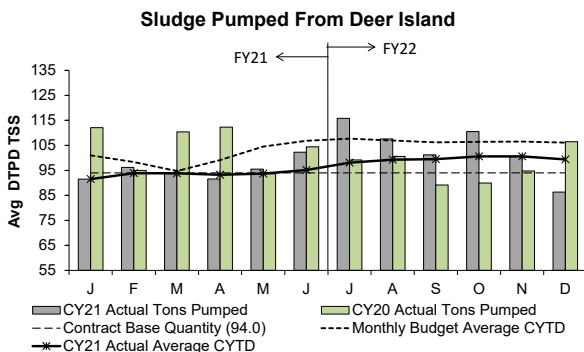
Total solids (TS) destruction is dependent on sludge detention time which is determined by primary and secondary solids production, plant flow, and the number of active digesters in operation. Solids destruction is also significantly impacted by changes in the number of digesters and the resulting shifting



The Avg Daily DiGas Production in the 2nd Quarter was 7.9% below the 6 Year Avg Daily DiGas Production. 99.7% of all the DiGas produced in the quarter was utilized at the Thermal Power Plant (TPP).

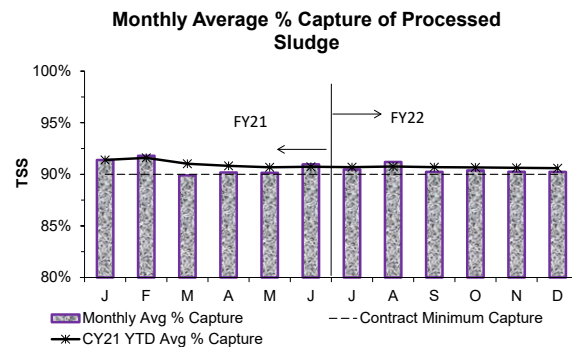
Residuals Pellet Plant

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 94.0 DTPD/TSS as an annual average (for the extended contract period of January 1, 2021 through December 31, 2022). The monthly invoice is based on 94.0 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 94.0 DTPD/TSS each year (FY21's budget is 107.9 DTPD/TSS and FY22's budget is 106.2 DTPD/TSS).

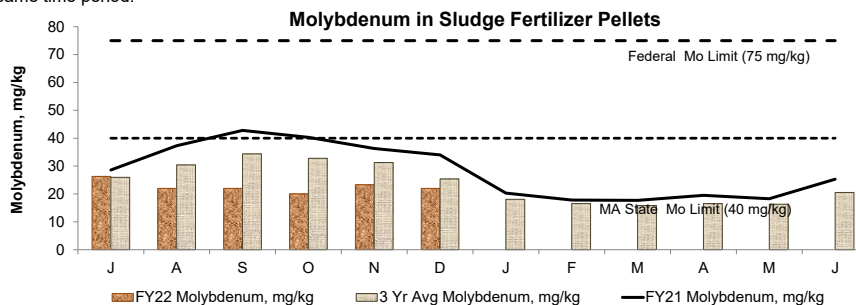


The average quantity of sludge pumped to the Biosolids Processing Facility (BPF) in the 2nd Quarter was 99.1 TSS Dry Tons Per Day (DTPD) - 6.2% below target with the FY22 budget of 105.7 TSS DTPD for the same period.

The overall CY21 average quantity of sludge pumped through December is 99.4 DTPD - 6.3% below target compared with the CY21-to-date average budget of 106.1 DTPD during the same time period.



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 90.29% and the CY21-to-date average capture was 90.60%.



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.

Overall, 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 29.8 mg/kg, 27% above the 3 year average, 46% below the MA State Limit, and 71% below the Federal Limit.

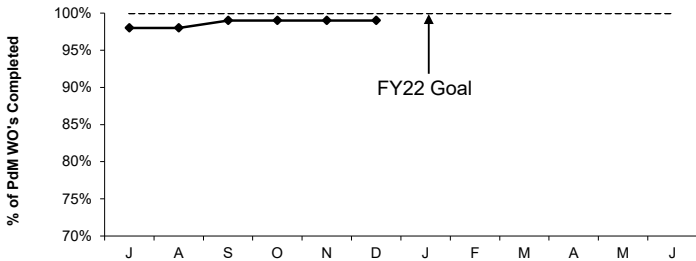
Deer Island Maintenance

2nd Quarter - FY22

Productivity Initiatives

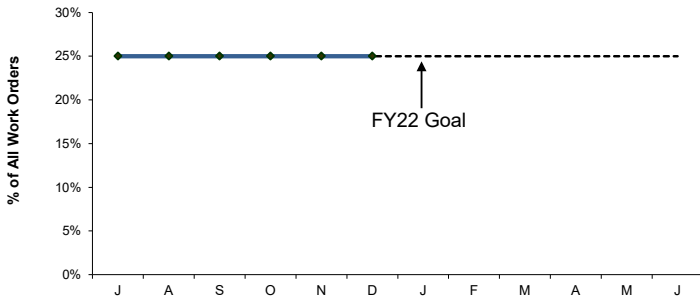
Productivity initiatives include increasing predictive maintenance compliance and increasing PdM work orders. Accomplishing these initiatives should result in a decrease in overall maintenance backlog.

Predictive Maintenance Compliance



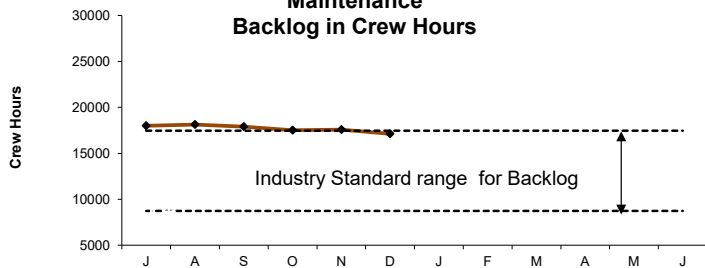
Deer Island's FY22 predictive maintenance goal is 100%. DITP completed 99% of all PdM work orders this quarter. DITP is continuing with an aggressive predictive maintenance program. Deer Island is below our goal this quarter, but we are trending upward.

Predictive Maintenance



Deer Island's increased FY22 predictive maintenance goal is 25% of all work orders to be predictive. 25% of all work orders were predictive maintenance this quarter. The industry is moving toward increasing predictive maintenance work to reduce downtime and better predict when repairs are needed.

Maintenance Backlog in Crew Hours

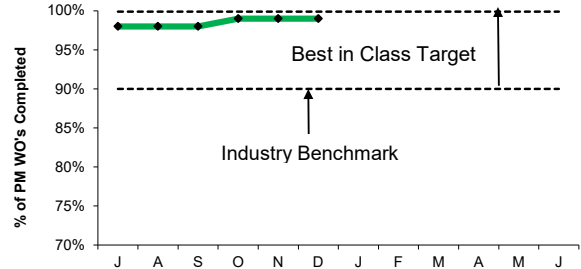


DITP's maintenance backlog at Deer Island is 17,120 hours this quarter. DITP is within the industry average for backlog. The industry Standard for maintenance backlog with 97 staff (currently planned staffing levels) is between 8,730 hours and 17,460 hours. Backlog is affected by (6) vacancies; (1) HVAC Tech (3) Electricians, and (2) Plumbers. Management continues to monitor backlog and to ensure all critical systems and equipment are available.

Proactive Initiatives

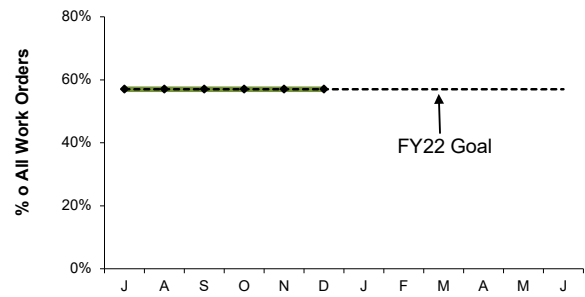
Proactive initiatives include completing 100% of all preventative maintenance tasks and increasing preventative maintenance kitting. These tasks should result in lower maintenance costs.

Preventive Maintenance Compliance



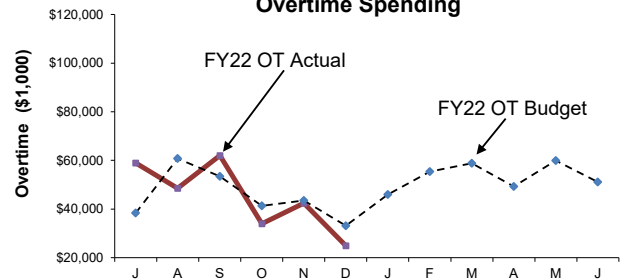
Deer Island's FY22 preventative maintenance goal is 100% completion of all work orders from Operations and Maintenance. DITP completed 99% of all PM work orders this quarter. Deer Island was below our goal, but well within Industry Standards.

Maintenance Kitting



Deer Island's increased FY22 maintenance kitting goal is 57% of all work orders to be kitted. 57% of all work orders were kitted this quarter. Kitting is staging of parts or material necessary to complete maintenance work. This has resulted in more wrench time and increased productivity.

Overtime Spending

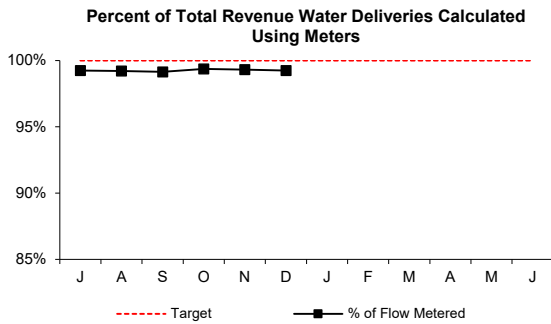


Maintenance overtime was over budget by \$17K this quarter and right on target for the year. Management continues to monitor backlog and to ensure all critical equipment and systems are available. This quarter's overtime was predominately used for Storm Coverage/High Flows, Pump/Grinder Clogging Issues, Replacement of (4) Heating Coils in Residuals, and Fabrication of RSL Shafts/Platform.

Operations Division Metering & Reliability

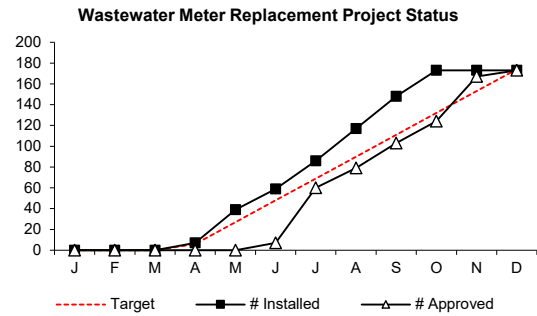
2nd Quarter - FY22

WATER METERS



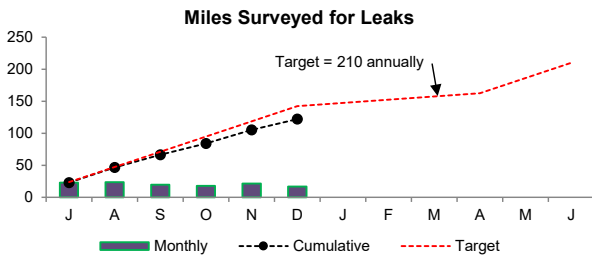
The target for revenue water deliveries calculated using meters is 100%. Estimates are generated for meters that are out of service due to instrumentation problems or in-house and capital construction projects. During Q2 FY22, 0.68% of the billed water flow was estimated. 99.32% was based on meter actuals. A total of 2.43% of the total flow was measured using annubar meters, mostly due to bypass valves that were opened in Lexington to increase the available flow to Burlington. An additional 1.0% was billed through 3 temporary bypass setups.

WASTEWATER METERS



The Wastewater Meter Replacement Project was approved at the October 2020 Executive Board meeting. The first installations were performed in the final week of April 2021. Through Q2 FY22 the contractor has installed and performed final confirmations on 173 meters out of the original total of 174. The remaining meter has been removed from the project. The installation phase has been completed on time and the Metering Department is on track to begin volume billing in January 2022.

WATER DISTRIBUTION SYSTEM PIPELINES



During the 2nd Quarter of FY22, 55.72 miles of water mains were inspected. The total inspected for the fiscal year to date is 122.06.

Leak Backlog Summary													
Month	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	Totals
Leaks Detected	2	2	0	1	1	1							7
Leaks Repaired	0	2	1	1	1	2							7
Backlog	5	5	4	4	4	3							n/a

During the 2nd Quarter of FY22 three leaks were detected, and four were repaired. Refer to FY22 Leak Report below for details. Also, community service ranging from individual leak location to hydrant surveys were conducted for Arlington, Medford, Newton, Revere, Saugus, Somerville and Swampscott.

2nd Quarter - Leak Report FY22

Date Detected	Location of Leaks	Repaired
07/01/21	Fellsway West @ Fells Ave., Medford	08/26/21
08/08/21	Fellsway East @ Pond St., Stoneham	08/18/21
07/28/21	Western Ave. @ WHDH Radio Station-Saugus	09/13/21
08/27/21	Middlesex Fells/Wellington, Medford	10/20/21
10/12/21	Middlesex Ave. @ Kensington, Somerville	11/23/21
07/01/16	241 Forest St., Winchester. Sect. 89	12/31/21
11/24/21	Waltham St. @ Lexington Line. Sec-101	12/02/21

Date Detected	Location of Leaks/Unrepaired
12/04/16	710 Ashland St/Summer St. Lynn, Sect 91. Not surfacing. Leaking emergency connection valve btw MWRA & LWSC systems. LWSC has difficulty isolating 16" main.
08/27/20	Hyde Park Ave. @ River St. Hyde Park. BWSC is in process of isolating their water main first.
12/27/21	River St. @ Willow St., Waltham

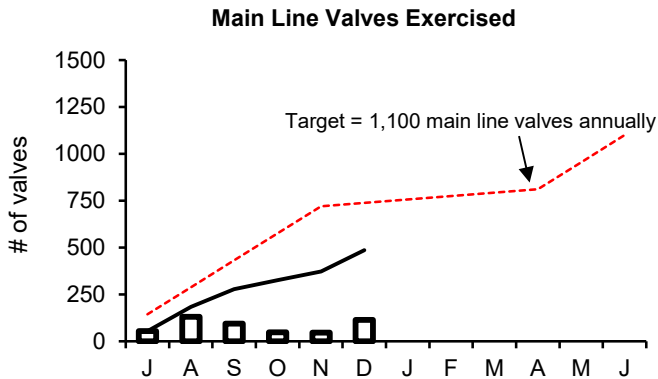
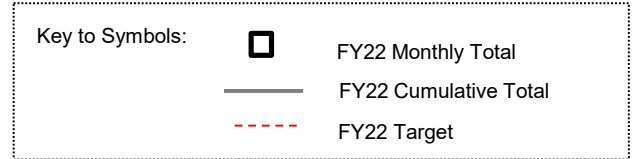
Water Distribution System Valves

2nd Quarter - FY22

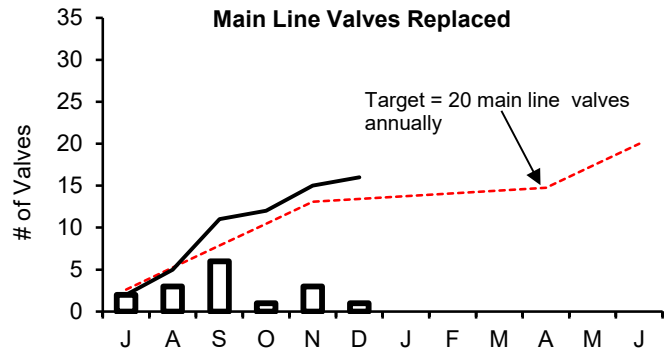
Background

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.

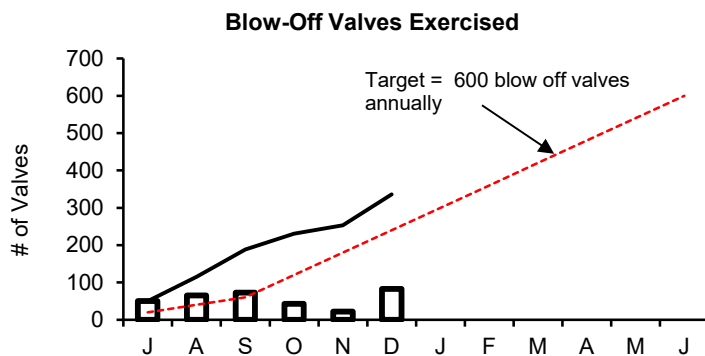
Type of Valve	Inventory #	Operable Percentage	
		FY22 to Date	FY22 Targets
Main Line Valves	2,159	97.1%	95%
Blow-Off Valves	1,317	98.6%	95%
Air Release Valves	1,380	95.6%	95%
Control Valves	49	100.0%	95%



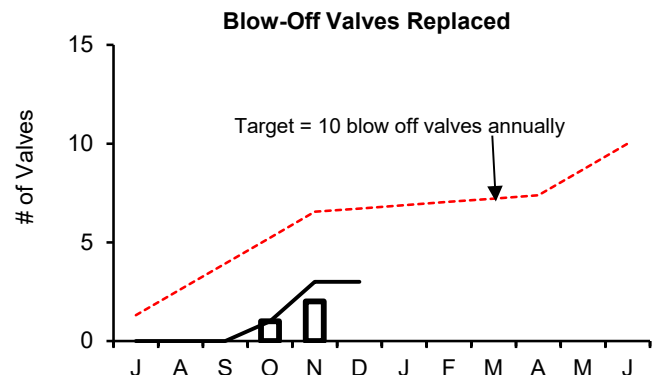
During the 2nd Quarter of FY22, 208 main line valves were exercised. The total exercised for the fiscal year to date is 486.



During the 2nd Quarter of FY22, there were five main line valve replaced. The total replaced for the fiscal year to date is sixteen.



During the 2nd Quarter of FY22, 148 blow off valves were exercised. The total exercised for the fiscal year to date is 336.

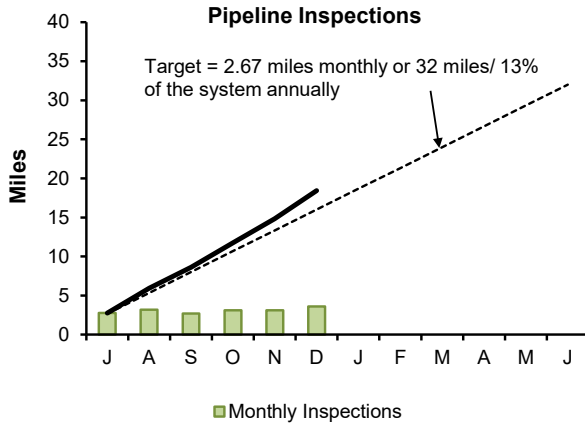


During the 2nd Quarter of FY22, there were three blow off valves replaced. The total replaced for the fiscal year to date is three. Below target due to isolation & permit issues and staff vacancies.

Wastewater Pipeline and Structure Inspections and Maintenance

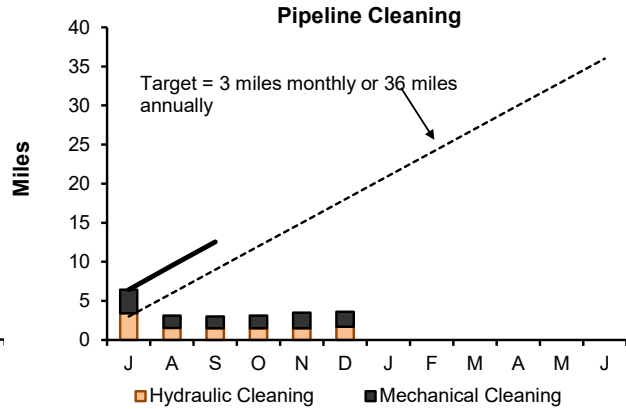
2nd Quarter - FY22

Inspections

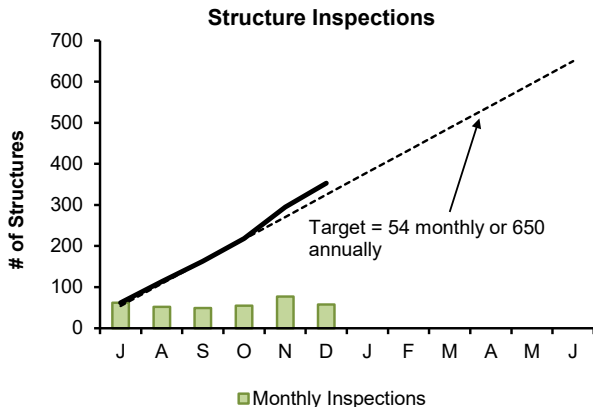


Staff internally inspected 9.80 miles of MWRA sewer pipe during this quarter. The year to date total is 8.63 miles. No Community Assistance was provided.

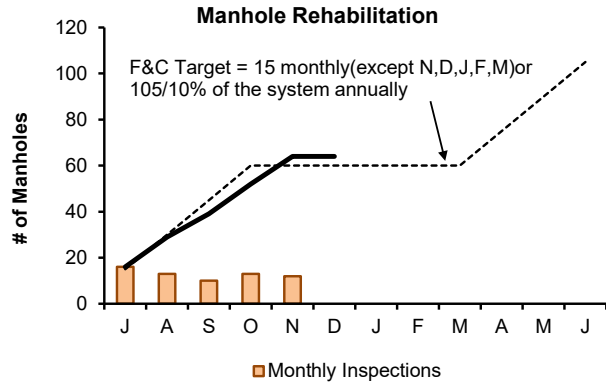
Maintenance



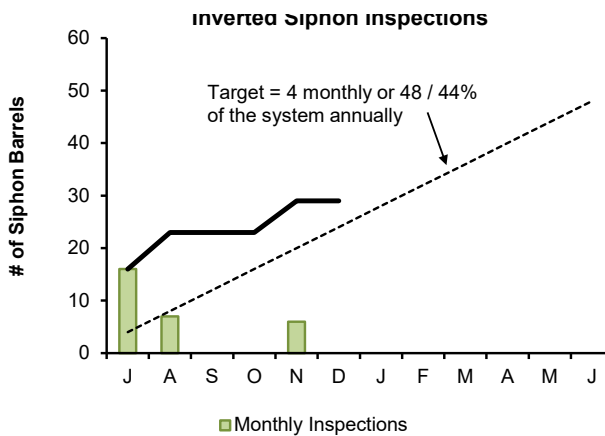
Staff cleaned 10.47 miles of MWRA sewer pipe, and removed 34 yards of grit. The year to date total is 23.02 miles. No Community Assistance was provided.



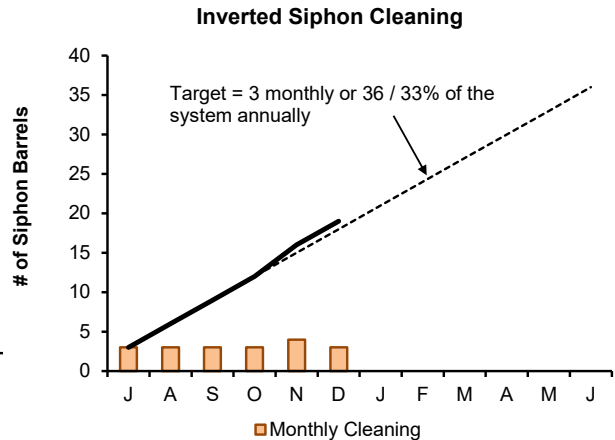
Staff inspected the 36 CSO structures and performed 154 other additional manhole/structure inspections during this quarter. The year to date total is 353 inspections.



Staff replaced 25 frame and cover replacements this quarter. The year to date total is 64.



Staff inspected 6 siphon barrels this quarter. The year total is 29 inspections.

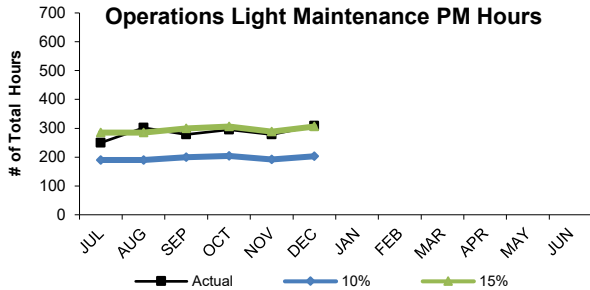


Staff cleaned 10 siphon barrels this quarter. The year total is 19.

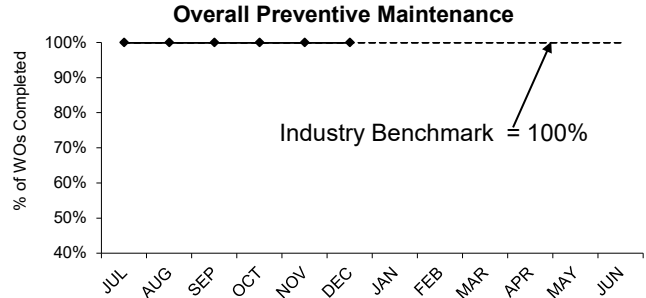
Field Operations' Metropolitan Equipment & Facility Maintenance

2nd Quarter - FY22

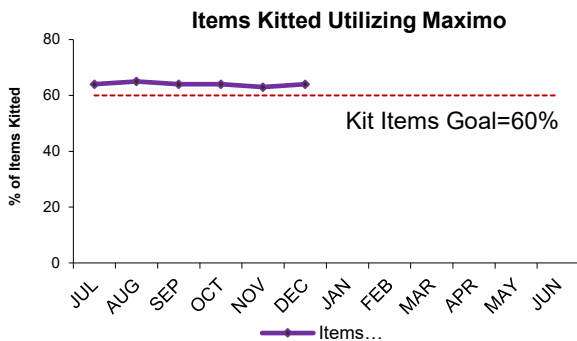
Several maintenance and productivity initiatives are in progress. The goal for the Overall PM completion and the Operator PM completion is 100%. The Operator PM and kitting initiatives frees up maintenance staff to perform corrective maintenance and project work, thus reducing maintenance spending. Backlog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



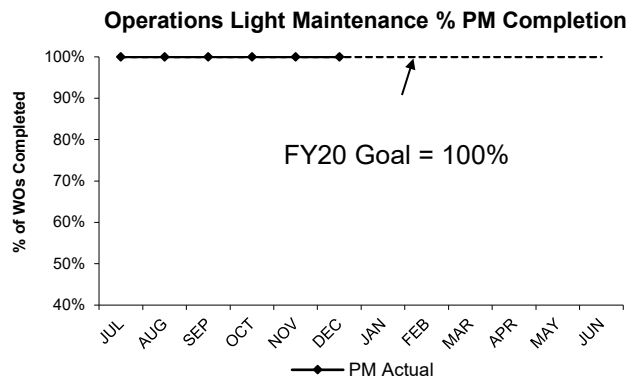
Operations staff averaged 294 hours per month of preventive maintenance during the 2nd Quarter of FY22, an average of 15% of the total PM hours for the 4th Quarter, which is within the industry benchmark of 10% to 15%.



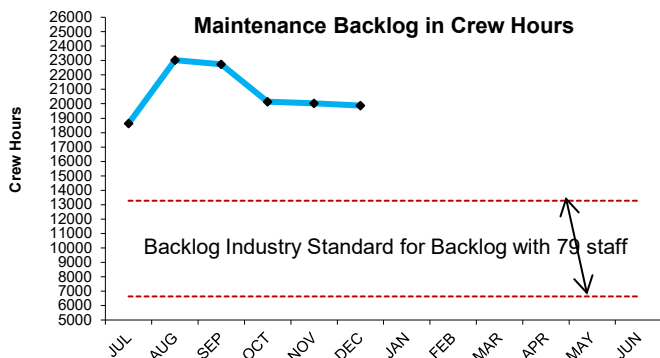
The Field Operations Department (FOD) preventive maintenance goal for FY22 is 100% of all PM work orders. Staff completed 100% of all PM work orders in the 2nd Quarter of FY22.



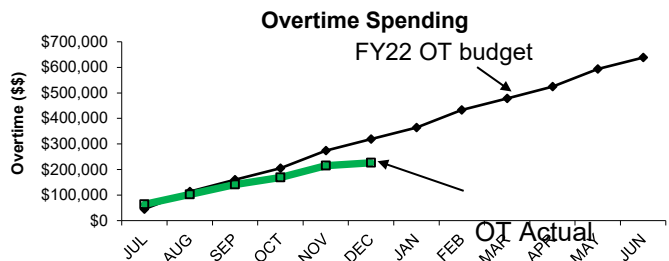
Operations' FY22 maintenance kitting goal has been set at 60% of all work orders to be kitted. Kitting is the staging of parts or material necessary to complete maintenance work. In the 2nd Quarter of FY22, 64% of all applicable work orders were kitted. This resulted in more wrench time and increased productivity.



Wastewater Operations complete light maintenance PM's which frees up maintenance staff to perform corrective maintenance. Operations' FY22 PM goal is completion of 100% of all PM work orders assigned. Operations completed 100% of PM work orders in the 2nd Quarter of FY22.



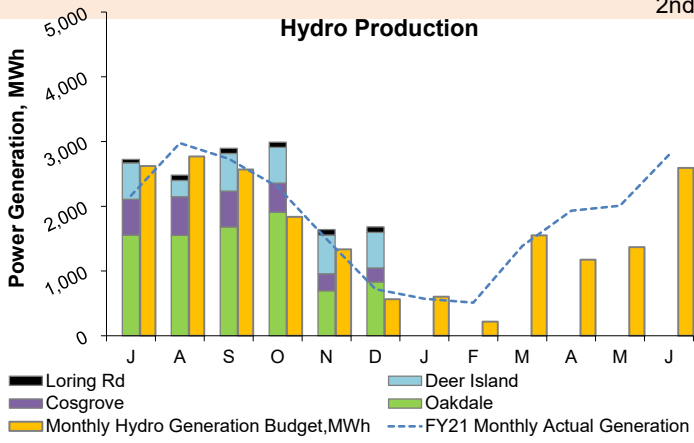
The 2nd Quarter of FY22 backlog average is 20,018 hours. Management's goal is to continue to control overtime and try to get back within the industry benchmark of 6,636 to 13,275 hours. The increase is due to vacations and several large maintenance projects.



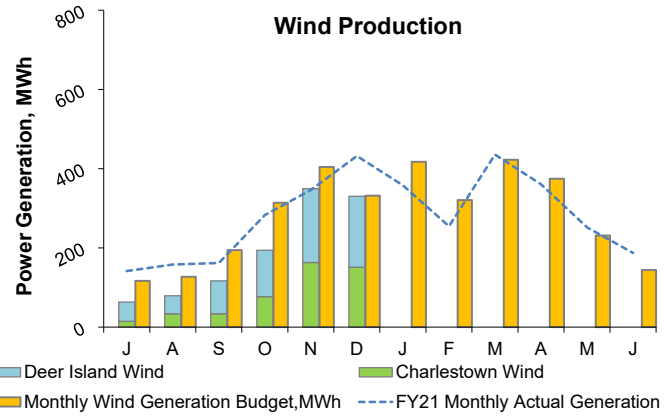
Maintenance overtime was \$28,565 under budget on average, per month, for the 2nd Quarter of FY22. Overtime is used for critical maintenance repairs and wet weather events. The overtime budget for the 2nd Quarter of FY22 is \$319,098. Overtime spending was \$226,365 which is \$92,733 under budget for the fiscal year.

Renewable Electricity Generation: Savings and Revenue

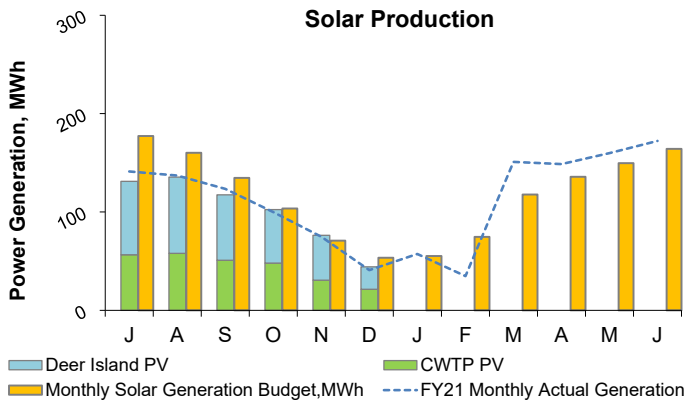
2nd Quarter - FY22



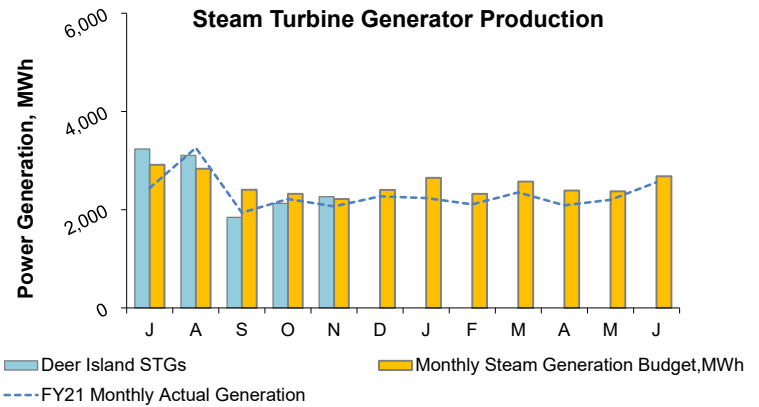
In Quarter 2 of FY22, the renewable energy produced from all hydro turbines totaled 6,461 MWh; 73% above budget³. The total savings and revenue to date in FY22 (actuals through Oct¹) is \$631,659 ; 101% above budget³. The savings and revenue value does not include RPS REC revenue (see next page).



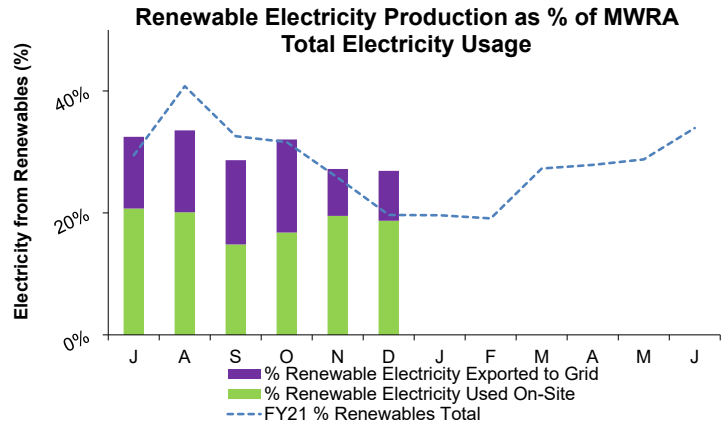
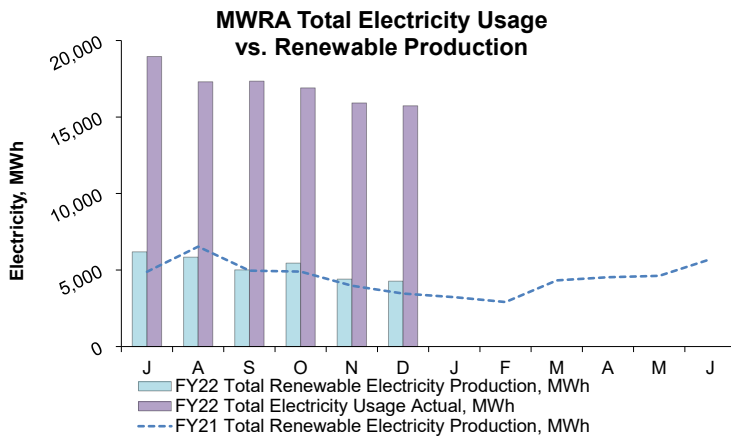
In Quarter 2 of FY22, the renewable energy produced from all wind turbines totaled 873 MWh; 17% below budget³. The total savings and revenue to date in FY22 (actuals through Oct¹) is \$66,114 ; 46% below budget³. The savings and revenue value does not include RPS REC revenue (see next page).



In Quarter 2 of FY22, the renewable energy produced from all solar PV systems totaled 76 MWh; 12% above budget³. The total savings and revenue to date in FY22 (actuals through Oct¹) is \$67,863 ; 7% below budget³. The savings and revenue value does not include RPS REC revenue (see next page).



In Quarter 2 of FY22, the renewable energy produced from all steam turbine generators totaled 6,572 MWh; 5% below budget³. The total savings and revenue to date in FY22 (actuals through Oct¹) is \$1,088,746 ; 13% above budget³. The savings and revenue value does not include RPS REC revenue (see next page).



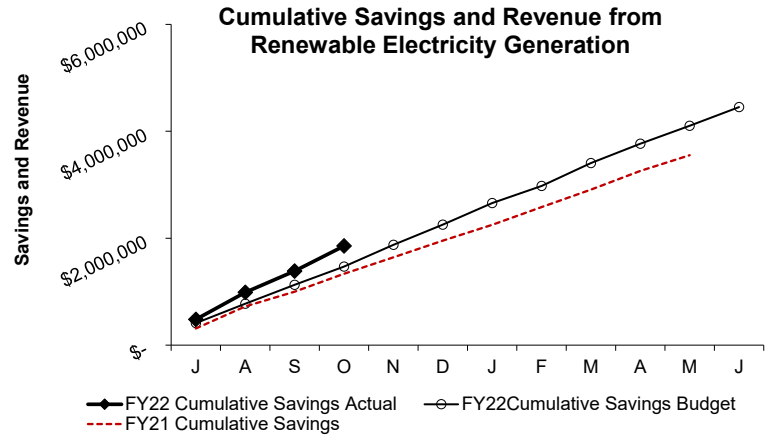
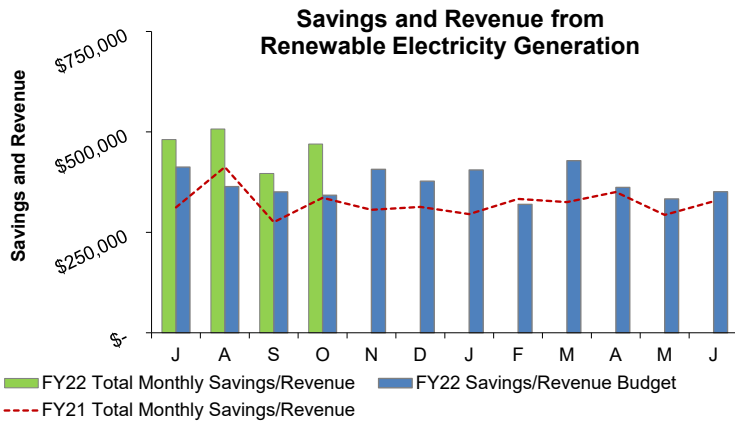
Quarter 2 of FY22, MWRA's electricity generation by renewable resources totaled 14,129 MWh, 18% above budget. MWRA's total electricity usage was approximately 48,565 MWh. Renewable generation was 29% of total electrical use. The MWRA total electricity usage is the sum of all electricity purchased for 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.

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.

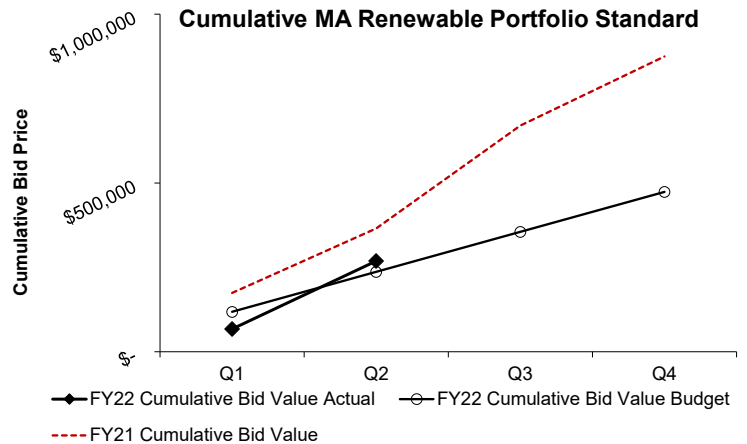
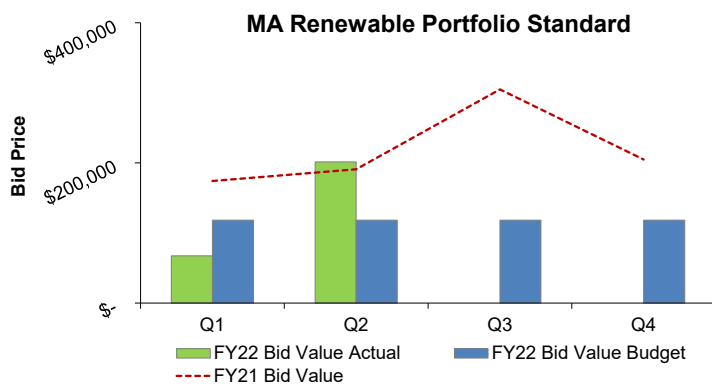
Renewable Electricity Generation: Savings and Revenue

2nd Quarter - FY22



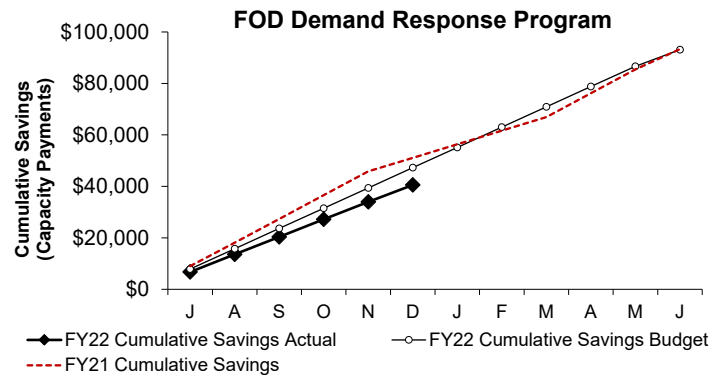
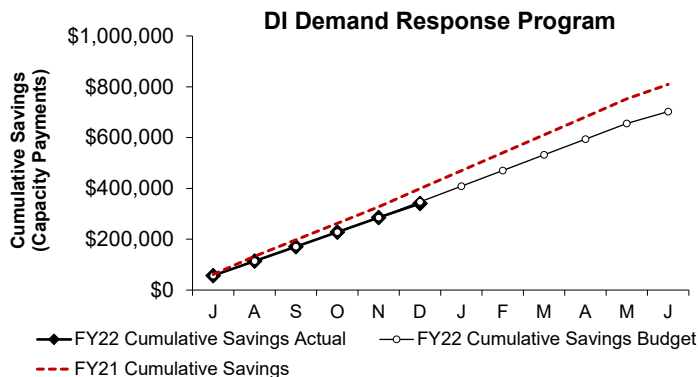
Savings and revenue from MWRA renewable electricity generation in the first four months of FY22 (actuals only through Oct¹) is \$1,854,382; which is 26% above the budget³.

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; 2,239 Q2 CY2021 Class I Renewable Energy Certificates (RECs); 3,301 Q2 CY2021 Class 2 RECs; and 97 Q2 CY2021 Solar RECs were sold for a total value of \$201,462 RPS revenue; which is 70% above budget³ 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.

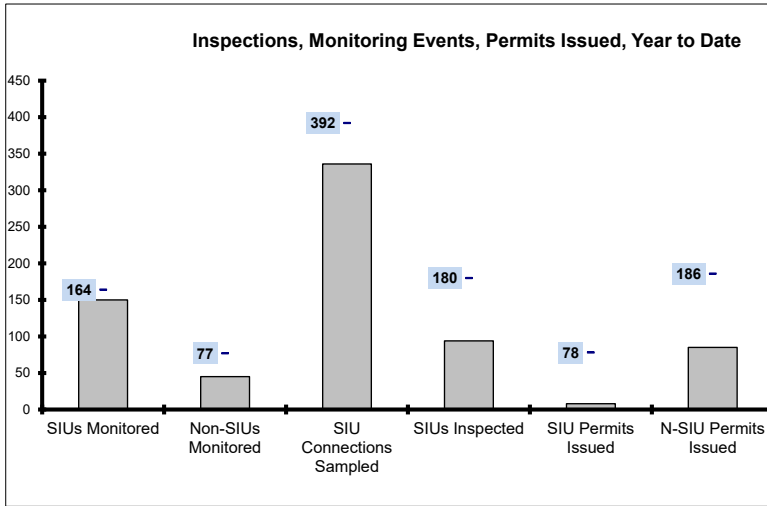


Currently Deer Island, JCWTP, Loring Rd, and Brutsch participate in the ISO-New England Demand Response Programs⁴. By agreeing to reduce demand and operate the facility generators to help reduce the ISO New England grid demand during periods of high energy demand, MWRA receives monthly Capacity Payments from ISO-NE. When MWRA operates the generators during an ISO-NE called event, MWRA also receives energy payments from ISO-NE. FY22 Cumulative savings (Capacity Payments only) through December¹ total \$340,455 for DI and payments for FOD total \$40,539 for the same 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 - FY22



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.

EPA requires MWRA to issue or renew 90 percent 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 percent of SIU permits to be issued within 180 days.

	Number of Days to Issue a Permit						Permits Issued	
	0 to 120		121 to 180		181 or more		SIU	Non-SIU
Jul	3	9	2	1	0	0	5	10
Aug	0	14	0	6	0	3	0	23
Sep	0	7	0	8	0	4	0	19
Oct	2	12	0	5	0	3	2	20
Nov	0	6	0	2	0	2	0	10
Dec	1	2	0	1	0	0	1	3
Jan							0	0
Feb							0	0
Mar							0	0
Apr							0	0
May							0	0
Jun							0	0

% YTD	75%	59%	25%	27%	0%	14%	8	85
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This is the second quarter of the MWRA fiscal year, FY22. SIU permit issuances are off to a slow start. This is mainly due to the incidences of staff turnover coupled with the workload of the available personnel and the effects of the COVID pandemic.

In the second quarter, 36 permits were issued, three of which were SIUs. All of the SIU permits were issued within the 120-day timeframe.

There were 33 non-SIU permits issued, of which 13 were issued late.

Reasons for late issuances continue to include a) waiting for critical data needed for permit processing and b) delays relating to new start-up operations - some result in the late payment of the relevant permit charges and in permits issued beyond the 120-day timeframe.

Overall in the first half of FY22, only 93 of the projected permits have been issued. For SIUs, only about 10% have been issued and they have a 75% compliance rate, falling short of the 90% compliance rate required by the EPA.

There have also been a number of facility closings since the COVID pandemic started and these are slowly being brought to the department's attention and being processed. For the Clinton Sewer Service area, there were no SIU permits issued in the first half of the fiscal year.

EPA Required SIU Monitoring Events
for FY22: 164
YTD: **150**

Required Non-SIU Monitoring Events
for FY22: 77
YTD: **45**

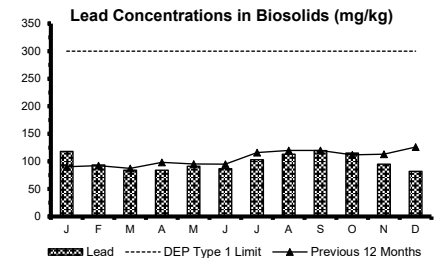
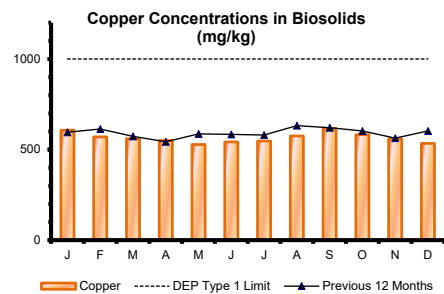
SIU Connections to be Sampled
For FY22: 392
YTD: **336**

EPA Required SIU Inspections
for FY22: 180
YTD: **94**

SIU Permits due to Expire
In FY22: 78
YTD: **8**

Non-SIU Permits due to Expire
for FY22: 186
YTD: **85**

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; changes in operations necessitating a change in SIU designation; 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; and also, increased/decreased inspections leading to permit category changes requiring additional monitoring events.



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.

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 – FY22

Western Water Operations and Maintenance

- Carroll Water Treatment Plant Annual Half Plant – Annual maintenance on side B of the plant began November 15 and finished on December 30. This shutdown provides a chance to clean tanks and perform tasks that would impact treatment when online. The critical work is the hypochlorite piping replacement that needs to be performed inside the flow path.
- Foss Reservoir Level – Foss Reservoir in Framingham was drained approximately 10 feet below its normal operating band during November as part of a periodic invasive plant species control program. Following sufficient freezing of plant roots, we will return to the normal operating band.

Metro Water Operations and Maintenance

- Valve Program: Valve operations to support in-house work including providing isolations on: Section 26 (Hydrant Replacement), Section 6 (Leak Repair), Section 86 (Leak Repair), Section 101 (Leak Repair), Watertown Supply Line (Leak Repair), Section 40 (Valve Replacement), Section 63 (Valve Replacement). CIP contractors were supported by isolation and dewatering of portions of WASM 11 and 12 and Section 51 (Contract 6544) as well as Meter 121 (Contract 6955). Other work included the disinfection of Section 79 after leak repair, the disinfection of Norwood's and Winthrop's Water Storage Tanks and mainline valve exercising of 8 water main sections.

Operations Engineering

- Staff continued community assistance as needed:
 - Testing of Newton's system with reduce storage volume.
 - Planning for Wayland and Natick emergency connections.
 - Initial system feasibility analysis for system expansion to the south and north.
 - Disinfection of Norwood and Winthrop community tanks.
 - Provided daily facility flow data to support Biobot Study.
- Staff continued to manage the lead pipe rig study at CWTP.
- Staff managed the outfall inspections at the Nut Island Headworks.
- Staff procured tank inspection services.
- Staff managed the carbon replacement for BWRPS and HNPS, and continued to monitor the performance on MWRA's carbon systems treating odorous air.
- Staff assisted in several wet weather storm events, compiled and finalized storm reports, monitored and reported on CSO activation durations and volumes and provided follow up on operational and SCADA issues.

Wastewater Operations & Maintenance

- Nut Island Headworks Odor Control & HVAC Improvements: Operations staff continues to attend weekly virtual coordination meetings with Engineering and Construction staff, the contractor and the consultant engineer for this project. The contractor continues to perform work on the facility odor control system, the facility boilers, HVAC ductwork, replacement of two underground fuel storage tanks, and the replacement of the facility's four (4) emergency spillway gates. Operations staff assisted with numerous MCC and odor control shutdowns to support this work. Operations staff also attended instrumentation and control meetings every week. Operations staff attended a meeting with SCADA and

Engineering Operations staff to discuss the layout of the new SCADA screens for the odor control system on 10/6/21. Operations staff supported the contractor in transferring fuel oil from the two existing underground storage tanks to the new underground storage tanks and assisted the contractor in completing work at the emergency spillway gates. Operations staff attended training on interim boiler operation and continue to monitor the system. Operations staff attended a meeting to discuss lost time/ increased cost claims on the project during the month of November. Operations staff assisted the contractor with commissioning odor control fan #3 and associated dampers, Operations also assisted with isolation and decommissioning of odor control fans #1 & #2 during the month of December.

- Cottage Farm Engine: Cottage Farm engine #2 was repaired and tested under load, and is now restored to full capacity.
- Ward Street and Columbus Park Headworks: Operations staff continues to work with Engineering staff and the consultant for this project to review concepts for super structure design, and to discuss and gather information about velocity and flow conditions in the influent channels at both facilities for upcoming channel inspections.
- Chelsea Creek Headworks: Wastewater Operations staff continues to work with Engineering & Construction staff and the contractor. This included support of punch list activities and testing the new security system. All channels and odor control system are in service. Operations staff attended meetings to walk through the facility and review remaining punch list items, and to discuss the implementation of the new security system.
- Operations & Maintenance Meeting: Operations and maintenance staff attended weekly meetings to discuss the top 25 critical maintenance items then need to be addressed.
- Nuisance alarms: Operations and Engineering Operations staff attended bi-weekly meeting to discuss the top 15 alarms that have come into SCADA to determine if operational issued are causing the condition.

Metro Equipment and Facility Maintenance

- Hayes Pump Station: MWRA plumbers installed new suction and discharge gauges needed for flow tests for rehabilitation.
- Nut Island Headworks: The baffle box for the #6 vortex was corroded beyond repair. MWRA mechanists, welders and mechanics fabricated and installed a new baffle box.
- MWRA electricians replaced perimeter lighting at the Somerville Chemical Building, and at the lower levels of Gillis Pump Station and Bellevue Tank with energy efficient LED fixtures.
- DeLauri Pump Station: MWRA machinist's fabricated new rake guides with structural enhancements which will prevent the rakes from catching and tripping the clutch.
- MWRA plumbers conducted annual backflow inspections for Spring Street, Commonwealth Ave, Dudley Road, Gillis, Lexington Street, and Belmont Pump Stations.

Field Operations Highlights

2nd Quarter – FY22

- Nut Island Headworks: MWRA mechanics and machinist replaced the worn out Conveyor #2 carry belt, worn bearings/shafts and rollers.

Metering

- Pandemic Response: This quarter continued to display trends that indicate that demand trends are returning toward normal, pre-pandemic averages. The overall demand in the entire system was down 1.6% compared to the pre-pandemic averages. Boston saw significant recovery to the COVID demand decrease with a 7.1% increase in demand compared to Q2FY21.
- Wastewater upgrade project: Through December, ADS installed meters and performed final confirmations at 173 of 174 total sites initially specified in the project (99%), with the lone remaining site having been removed from the project. Installs are thus considered complete. Meter data is set to begin billing communities using metered volumes starting in January 2022.

TRAC

Compliance and Enforcement

- TRAC issued 39 Notices of Violation, 1 Extension Letter and 1 Notice of Noncompliance/Order.
- Annual Fees: The Fiscal Year 2022 Annual Permitting and Monitoring Charge invoices were issued for all permits except the new group Dental Discharges permits. Those invoices will be issued in the Spring of 2022.

Inspections and Permitting

- This second quarter TRAC issued a total of 106 MWRA 8(m) Permits allowing companies to work within an easement or other property interest held by the Authority. Permits were issued in an average of 80 days from receipt.
- TRAC monitored the septage receiving sites a total of 30 times. Staff conducted inspection at 38 new construction gasoline/oil separators and 147 existing gasoline/oil separators.
- 35 MWRA Sewer Use Discharge Permits (Permits) were issued and/or renewed to its sewer users. No permits were issued and/or renewed in the Clinton Service Area.

Monitoring

- During the second quarter of FY22, TRAC completed 110 first time SIU monitoring events, 19 first time NSIU monitoring events and 397 other events including Clinton NPDES sampling, Clinton Local Limits sampling, Metropolitan Local Limits sampling, Clinton and Metropolitan Local Limits PFAS sampling, Special Sulfide sampling, Cosgrove and Oakdale NPDES sampling, CSO NPDES sampling, Sudbury Aqueduct monitoring and CSO Hypochlorite Tank chemical sampling.

Environmental Quality-Water

- Algae: MWRA completed seasonal algae monitoring in October; DCR continued to monitor both reservoirs throughout the quarter. Staff reviewed buoy and sampling data extensively due to Microcystis detection at the Wachusett Reservoir in October. All algal toxin testing was non-detect and all other nuisance algae were below levels of concern.

Community & In-House Support

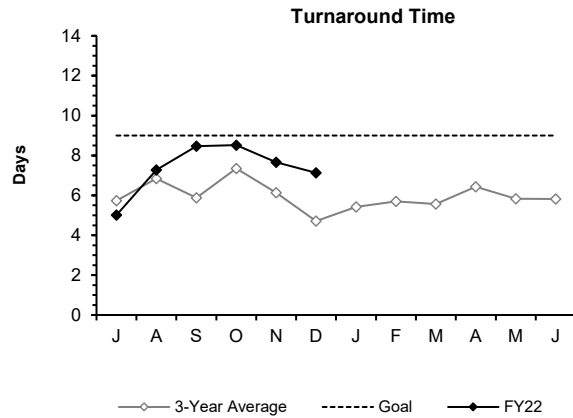
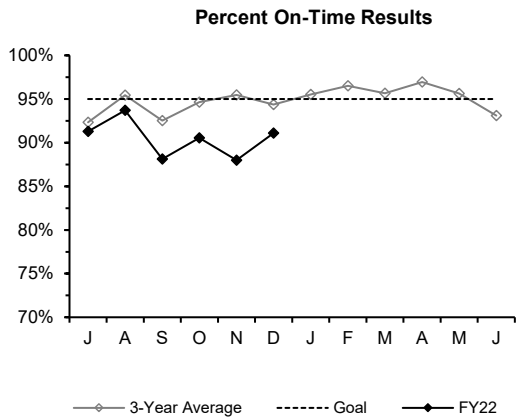
- Sampling & Analysis: Staff provided support to several communities throughout the quarter including Winthrop: 10/6, 12/2 & 3; Norwood: 10/6, 22 & 11/2; Arlington: 10/15; Wakefield: 10/18; Reading: 10/21; Chelsea: 11/1; Marlborough: 11/26.
- Training & Guidance: On two occasions, staff provided a virtual presentation to community water departments regarding proper coliform sampling technique and chlorine measurement. Additionally, staff held four meetings with community water superintendents, and presented at MWRA's Emergency Response Planning Program training to review source and finished water quality data.
- Contaminant Monitoring System (CMS): Staff responded to seven CMS alarms this quarter. Staff followed routine response protocols during each incident. Staff also exercised the mobile contaminant response trailer as part of emergency preparedness activities. All system components functioned successfully.
- Chemical Supply: Staff are closely monitoring bulk chemical inventories and contract adherence to delivery schedules. Staff continue to work on chemical supply emergency planning.

Environmental Quality-Wastewater

- Ambient Monitoring: Due to hazardous weather, the final scheduled water column survey of the 2021 field season was deferred to early November. Results from the November survey showed exceedance of the dissolved oxygen concentration and percent saturation thresholds in Stellwagen Basin; required notifications to the regulators and interested parties were made. Analysis of datasets collected in 2021 continues. The annual Outfall Monitoring Overview for 2020 was completed, presented to the Board of Directors in October, and submitted to regulatory agencies in November as required by the NPDES permit. The Outfall Monitoring Science Advisory Panel met on December 6.
- Harbor/CSO Receiving Water Monitoring: The CSO receiving water monitoring ended for the season in October while the biweekly monitoring will continue through the winter.
- Cooperation with other agencies: Worked with the Massachusetts Bays Partnership to plan and conduct a forum on low dissolved oxygen in Cape Cod Bay in recent years, as well as attending meetings of the MBP Management Committee. Met with Gloucester Health Department and wastewater staff to discuss their enterococci sampling results and share information on our sampling and monitoring experiences. Submitted comments to MassDEP on new regulation implementing the Sewage Notification Law, and to Mass. Coastal Zone Management on the Massachusetts Ocean Plan update. Staff presented at the annual meeting of the Regional Association for Research in the Gulf of Maine and at the Coastal and Estuarine Research Federation on red tide in Massachusetts Bay

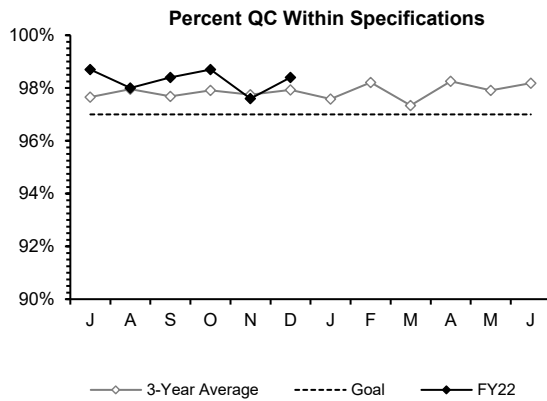
Laboratory Services

2nd Quarter - FY22

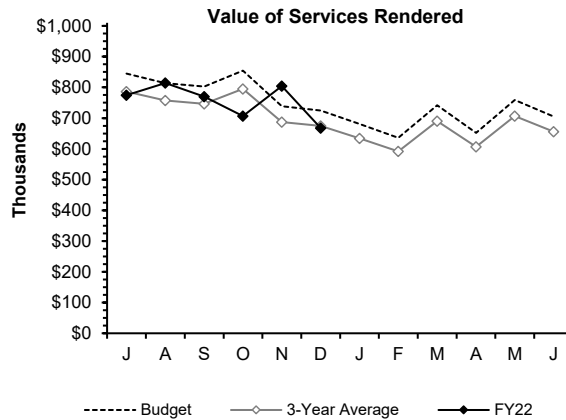


The Percent On-Time measurement fell below the 95% goal due to staffing vacancies.

Turnaround Time met the 9-day goal.



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



Value of Services Rendered is 2.6% below the annual budget projection due to staffing vacancies

Performance:

Met Turnaround Time, Percent QC within Specification indicators for the quarter at reduced staffing level. Value of Services Rendered is slightly below budget, but ahead of the 3-year average year to date.

School Lead Program:

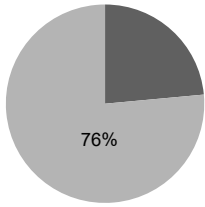
During the 2nd quarter of FY22, MWRA's lab completed 112 tests from 18 schools and childcare facilities in 7 communities. Since 2016, MWRA's Laboratory has conducted over 39,000 tests from 535 schools and daycares in 44 communities. We have also completed 657 home lead tests under the DPH sampling program since 2017.

CONSTRUCTION PROGRAMS

Projects In Construction

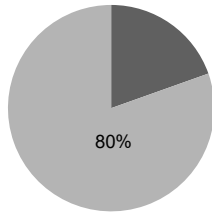
2nd Quarter – FY22

Money



- Amount Remaining
- Billed to Date

Time



- Days Remaining
- Days Expended

Permanent Metering Replacement and Installation

Project Summary: This project consists of the replacement of 174 flow meters in sewer manholes located throughout the MWRA service district.

Contract Amount: \$3,291,198.64

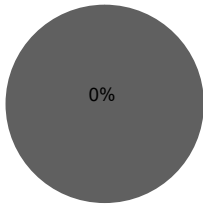
Contract Duration: 450 Days

Notice to Proceed: 3-Dec-20

Contract Completion: 26-Feb-22

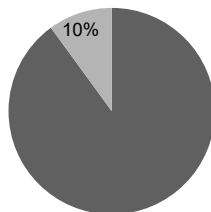
Status and Issues: As of December, the Contractor installed 173 meters of which, 159 have received final acceptance. All meter confirmations are complete.

Money



- Amount Remaining
- Billed to Date

Time



- Days Remaining
- Days Expended

Section 89 Replacement Pipeline

Project Summary: This project will include replacement of a 10,500-foot portion of PCCP with class IV reinforcing wire, line valves and appurtenances, and abandonment of the 118-year old, 24-inch diameter cast iron Section 29 pipeline.

Contract Amount: \$32,619,000

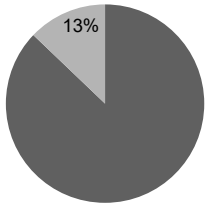
Contract Duration: 1,475 Days

Notice to Proceed: 15-Aug-21

CoContract Completion: 25-Aug-25

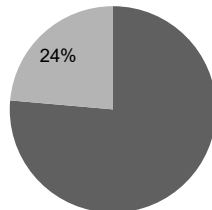
Status and Issues: As of December, the Contractor continued to secure the necessary permits, laydown areas and organizing the field office. They have continued to provide submittals for review and have completed pre-construction videos of phase one surface areas.

Money



- Amount Remaining
- Billed to Date

Time



- Days Remaining
- Days Expended

Low Service PRV Improvements

Project Summary: This project will replace pressure reducing valves on the Weston Aqueduct Supply Main (WASM) 4 at Nonantum Road in Boston and WASM 3 at Mystic Valley Parkway in Medford

Contract Amount: \$11,326,000

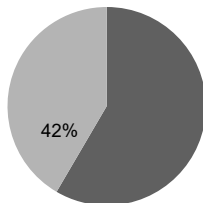
Contract Duration: 720 Days

Notice to Proceed: 14-Jul-21

Contract Completion: 4-Jul-23

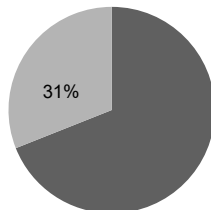
Status and Issues: As of December, the contractor Installed forms and placed concrete for the north and south vertical walls of the cast in place (CIP) vault. Loaded trucks with excavated material for disposal. They installed rebar and wall pipe sleeves for the east and west vertical walls of the CIP vault.

Money



- Amount Remaining
- Billed to Date

Time



- Days Remaining
- Days Expended

Rehabilitation of WASM 3

Project Summary: This project consists of the rehabilitation of 13,800 feet of 56-inch and 60-inch diameter water main in Arlington, Somerville and Medford.

Contract Amount: \$19,656,427.23

Contract Duration: 1,383 Days

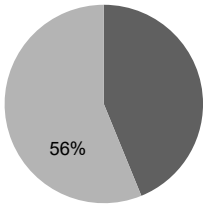
Notice to Proceed: 28-Oct-20

Contract Completion: 11-Aug-24

Status and Issues: As of December, the Contractor installed and welded a new (20 lf) 60" steel connection piece to the existing cement lined pipes, backfilled and paved at AP 14 Irvington Road Somerville. They finished cleaning and cement lining the 60" water main from AP 12 to AP 13B (505 LF) and AP 11 towards AP 10 in Town of Arlington.

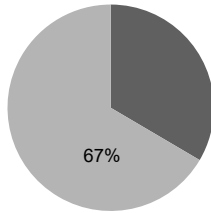
Projects In Construction 2nd Quarter – FY22

Money



■ Amount Remaining
■ Billed to Date

Time



■ Days Remaining
■ Days Expended

Nut Island Odor Control and HVAC

Project Summary: This project will provide upgrades to the odor control system, heating, ventilation and air conditioning system and other equipment.

Contract Amount: \$58,541,461.62

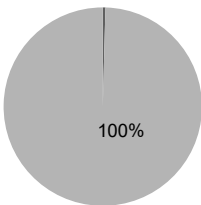
Contract Duration: 1,034 Days

Notice to Proceed: 12-Feb-20

Contract Completion: 12-Dec-22

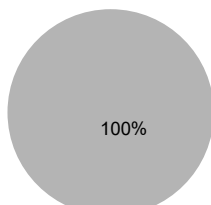
Status and Issues: As of December, the Contractor set frames and covers to grade for the underground storage tank (UST) and adjusted rebar to grade. They placed 4,000 psi concrete for the top slab, finished, and cured after which, they removed the forms and backfilled and compacted around the top slab and removed the access covers at abandoned existing USTs.

Money



■ Amount Remaining
■ Billed to Date

Time



■ Days Remaining
■ Days Expended

Chemical Tank Relining & Pipe Replacement

Project Summary: This project involves replacing the chlorobutyl rubber linings in 3 sodium hypochlorite and 2 sodium bisulfite storage tanks and assorted gravity thickener overflow piping at Deer Island.

Contract Amount: \$8,698,341

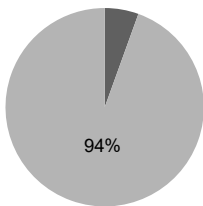
Contract Duration: 850 Days

Notice to Proceed: 13-Aug-19

Contract Completion: 10-Dec-21

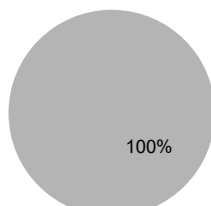
Status and Issues: As of December, the Contractor complete the 7-day leak test for Sodium Bisulfite Tank No. 2., they complete miscellaneous punch list items and began demobilizing from site.

Money



■ Amount Remaining
■ Billed to Date

Time



■ Days Remaining
■ Days Expended

Clinton Valve and Pipe Replacement

Project Summary: This project involves the replacement of return activated sludge, waste activated sludge and plant water valves and associated piping.

Contract Amount: \$488,946.27

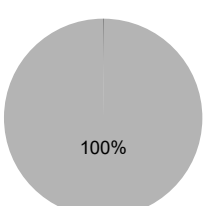
Contract Duration: 493 Days

Notice to Proceed: 8-Sep-20

Contract Completion: 14-Jan-22

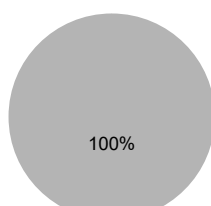
Status and Issues: As of December the Contractor addressed punch list items (valve tags, pipe stenciling, grouting, concrete repair, installation of SS chain and replacement of damaged flanges) and has completed all project related work with the exception of touch-up paint to the concrete pedestals.

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.

Contract Amount: \$20,223,830.33

Contract Duration: 1,230 Days

Notice to Proceed: 11-May-18

Contract Completion: 22-Sep-21

Status and Issues: As of December, the contract is being closed out.

CSO CONTROL PROGRAM

2nd Quarter – FY22

All 35 projects in the CSO Long-Term Control Plan (LTCP) were complete as of December 2015 in compliance with milestones in the Federal District Court Order. MWRA has completed a multi-year CSO post-construction monitoring program and performance assessment, filing the Final CSO Post Construction Monitoring Program and Performance Assessment Report with the Court and submitted copies to EPA and DEP in December 2021. The report shows that 70 of 86 outfalls met the LTCP goals for CSO activation frequency and volume. MWRA and its member CSO communities are moving forward with plans to bring 6 of the 16 CSOs in line with the LTCP goals. The remaining 10 will require further investigation to determine an appropriate plan. The MWRA is in discussion with the court parties and anticipates a 3-year extension to accomplish these remaining efforts. MWRA Board of Directors on December 15, 2021 gave approval to approach the Court to file a motion for a 3 year extension. Of the \$913.1 million budget in the FY22 CIP for the CSO Control Program, **approximately \$2.5 million remain to be spent**, as described below.

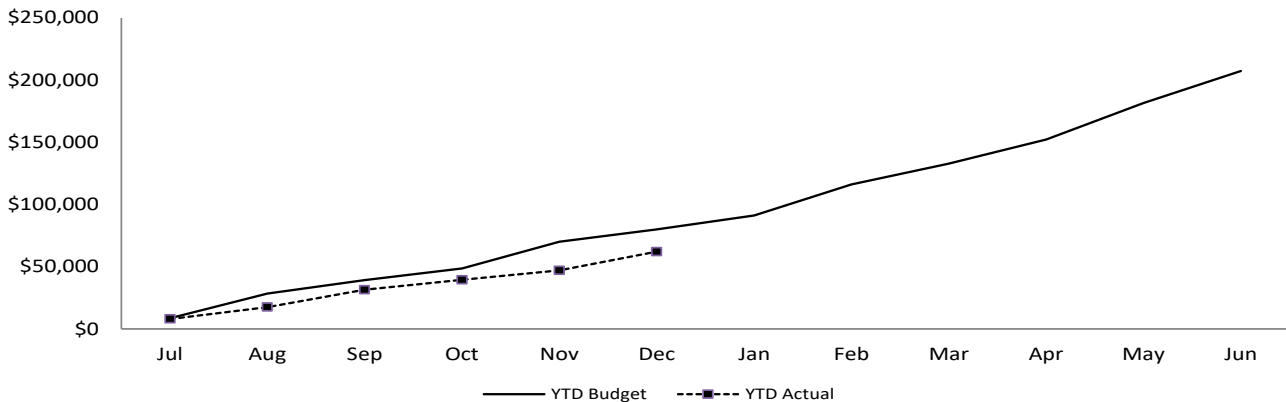
Project/Item	Status as of December 31, 2021
BWSC Dorchester Interceptor Inflow Removal	This agreement with BWSC provided up to \$3.76 million in MWRA financial assistance for reimbursement of the eligible costs of construction to remove inflow from the BWSC's Dorchester Interceptor system. BWSC awarded one construction contract for inflow removal in the amount of \$1.58 million. BWSC completed the contract work on June 30, 2021, when the financial assistance agreement ended. MWRA has received payment requests from BWSC for a portion of the expended amount, which is under review. \$2.18 million of remaining funds in the Dorchester agreement has been transferred into a new agreement by which BWSC will construct sewer separation and other CSO improvements in East Boston (see below).
BWSC East Boston Sewer Separation and other CSO Improvements	On April 14, 2021, the MWRA Board of Directors authorized the East Boston CSO financial assistance agreement in the amount of \$2.18 million for a term of two years, from July 1, 2021 through June 30, 2023. BWSC and MWRA executed the agreement on June 10, 2021. BWSC has awarded East Boston Sewer Separation Contract 3 and is finalizing design of an upgraded connection to the MWRA system to lower CSO discharges at Outfall BOS014. Per the agreement, BWSC has submitted a request for payment of two-thirds of the agreement amount upon contract award, which had been processed on September 16, 2021 in the amount of \$1,454,445. BWSC is eligible for the remaining one-third of the agreement amount once as-builts have been produced for the BOS014 modifications. It is anticipated that the request along with the as-build will come in May.
City of Cambridge Memorandum of Understanding and Financial Assistance Agreement	The City of Cambridge attained substantial completion of its last MWRA CSO plan project in December 2015 in compliance with Schedule Seven. The \$100.2 million MOU/FAA by which MWRA funded the eligible costs of the Cambridge-implemented CSO projects ended on June 30, 2018. With the assistance of internal audit, MWRA recently revisited the final eligibility review of the Cambridge construction contracts, making a few revisions and reviewing those edits with Cambridge. Staff expect to issue a final eligibility certification in Q3 FY22.
City of Somerville Financial Assistance Agreement	By this agreement, MWRA will provide up to \$1.4 million upon construction award of City of 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 completed the design that includes a cementitious/geopolymer lining and has awarded to National Water Main. The City of Somerville has provided details of the notice to proceed and has begun to process the payment in accordance with the FAA.
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 LTCP goals are attained. The current contract amount is \$5.28 million of which approximately \$4.6 million has been spent.</p> <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 certain 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. In compliance with the CSO variances, MWRA has implemented a subscriber-based system to notify the public of CSO discharges at its permitted outfalls within four hours of the start of discharge at each location, using meter readings. MWRA also reports estimated discharge volumes on its CSO notification web page. Cambridge and Somerville are also parties to the variances and have implemented notification systems for their own outfalls. AECOM continues to make progress with CSO variance-required project evaluations and other site-specific investigations to mitigate CSO discharges at locations where LTCP goals are not yet attained. In these efforts, MWRA is maintaining close coordination with the CSO communities. CSO mitigation implemented in late 2020/early 2021 included: BWSC completed its East Boston sewer separation Contract 1, Chelsea raised the overflow weir at Outfall CHE004, Cambridge removed heavy sediments in the Outfall CAM401A system, - all expected to bring associated outfalls into attainment with LTCP discharge goals. In addition, Cambridge completed the partial sewer separation improvements that have reduced discharges from the Cottage Farm facility. MWRA has reached the 100% design stage associated with the new interceptor connection at Chelsea's Outfall CHE008 which is currently under procurement review. Design has begun to add a new connection to the Somerville Marginal Conduit upstream of the Somerville Marginal Facility which is predicted to significantly reduce CSO discharges at from the facility (MWR205/MWR205A). MWRA and BWSC continue to work on a project to improve flow conveyance at Outfall BOS017 in Charlestown. Final design of the dry-weather connection in East Eagle Square to be constructed under an allowance with BWSC's Construction contract 3 (partially funded by MWRA) was reviewed and approved. Modification to BOS014 are being constructed as long as weather conditions allow. BWSC has also commenced construction of South Boston sewer separation Contract 1 that will lower CSO discharges to Fort Point Channel.</p> <ul style="list-style-type: none"> • AECOM updated the MWRA hydraulic model to Q4-2021 system conditions in part to produce an updated Typical Year CSO performance assessment relative to the LTCP activation and volume goals. The Final CSO Post Construction Monitoring Program and Performance Assessment Report which was submitted to the Court and EPA and DEP on December 29, 2021. The report shows that 70 of 86 outfalls met the LTCP goals for CSO activation frequency and volume. MWRA and its member CSO communities are moving forward with plans to bring 6 of the 16 CSOs in line with the LTCP goals. The remaining 10 will require further investigation to determine an appropriate plan. MWRA and the CSO communities will continue to identify and evaluate alternatives to further reduce discharges at these outfalls. • Utilizing receiving water quality models of the Lower Charles River and the Alewife Brook/Upper Mystic River AECOM completed and calibrated last fall, it performed water quality assessments of current river conditions and the impacts of remaining CSO and non-CSO (dry weather and stormwater) pollution sources. MWRA responded to comments provided on the draft and distributed a final Water Quality Assessment Report to EPA, DEP, the CSO communities, Charles River Watershed Association, and Mystic River Watershed Association. MWRA submitted the Water Quality Alternatives Assessment report in December. Comments on the report were received and the MWRA will respond to each individual. The comments were outside of the scope of the report and therefore the report will not be re-issued.

CIP Expenditures 2nd Quarter – FY22

FY22 Capital Improvement Program Expenditure Variances through December by Program - (\$ in thousands)				
Program	FY22 Budget Through December	FY22 Actual Through December	Variance Amount	Variance Percent
Wastewater	\$43,894	\$36,302	(\$7,592)	-17%
Waterworks	\$30,819	\$23,689	(\$7,131)	-23%
Business and Operations Support	\$5,289	\$2,156	(\$3,133)	-59%
Total	\$80,002	\$62,146	(\$17,855)	-22%

Project underspending within Wastewater was due to updated construction schedule for Prison Point Rehabilitation contract, timing of grant and loan distributions for the I/I Local Financial Assistance program, completion of some design and inspection tasks were later than anticipated for Ward Street and Columbus Park Headworks Upgrades Design/CA, timing of final work for Winthrop Terminal Facility (WTF) VFD Replacement, Gravity Thickener Rehab, and the Dorchester Interceptor Sewer. This underspending was partially offset by work scheduled in FY21 that was completed in FY22 for the Chelsea Creek Headworks Upgrades and NI Odor Control & HVAC Construction, work completed earlier than anticipated for East Boston CSO Control, and timing of payment for Dorchester I/I Removal work. Project underspending in Waterworks was due to updated schedules for the NIH Section 89 & 29 Replacement, and CP-3 Sections 23, 24, and 47 Design CA/RI contracts, timing of community distributions for the Water Loan program, and scope reduction for Sections 50 & 57 Water Rehabilitation - Design/ESDC. This underspending was partially offset by earlier than anticipated land purchase for the Tunnel Admin, Legal & Public Outreach contract, and contractor progress for WASM/Spot Pond Supply Mains Pressure Reducing Valves Improvements, WASM 3 Rehabilitation CP-1 and CP-1 Shafts 6, 8, and 9A construction.

Budget vs. Actual CIP Expenditures (\$ in thousands)
Total FY22 CIP Budget of \$207,312



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 12/25/21	\$159.3million
Unused capacity under the debt cap:	\$1.74 billion
Estimated date for exhausting construction fund without new borrowing:	Apr-22
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 FY22 Cash Flow Expectancy*:	\$186 million

* Cash based spending is discounted for construction retainage.

DRINKING WATER QUALITY AND SUPPLY

Source Water – Microbial Results and UV Absorbance

2nd Quarter – FY22

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 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.

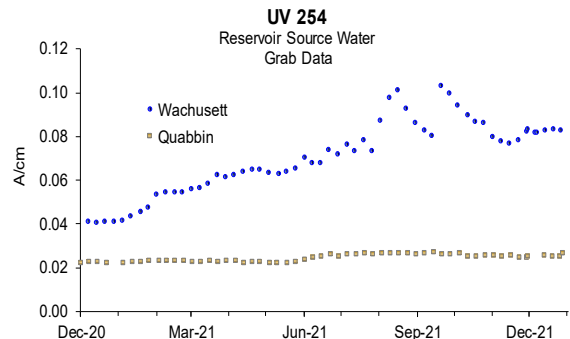
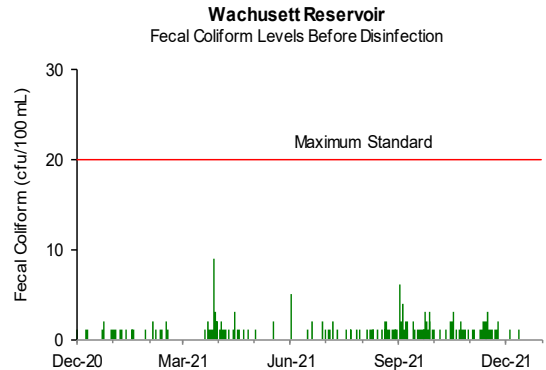
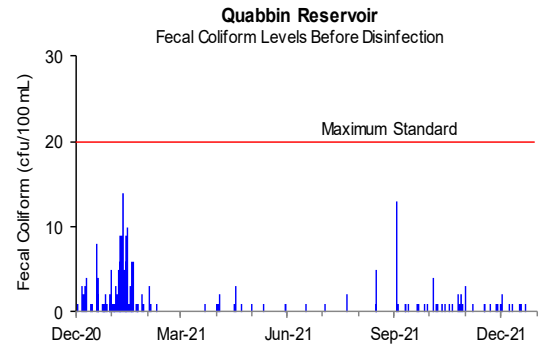
All samples collected during the 2nd Quarter were below 20 cfu/100mL. **For the current six-month period, 0.0% of the samples exceeded a count of 20 cfu/100mL.**

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 averaged 0.025 A/cm for the quarter.

Wachusett Reservoir UV-254 levels averaged 0.083 A/cm for the quarter.



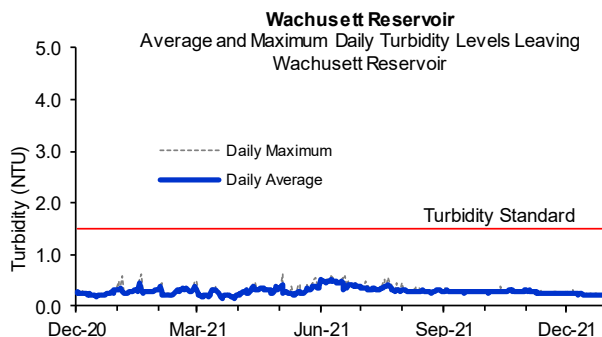
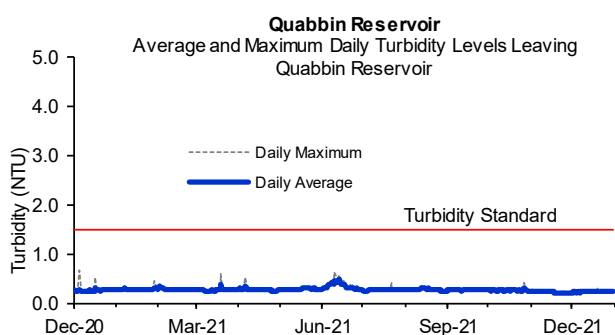
Source Water – Turbidity

2nd Quarter – FY22

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.

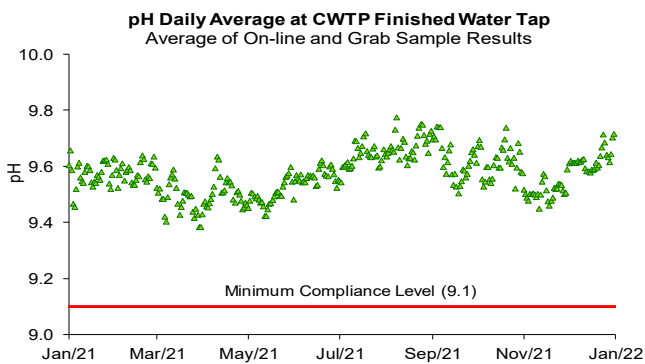
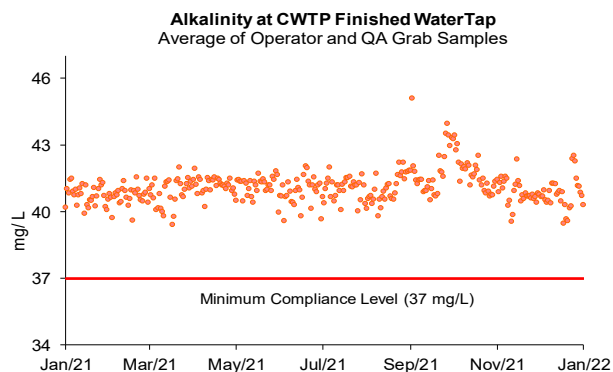


Treated Water – pH and Alkalinity Compliance

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.

Quarterly distribution system samples were collected over a course of two weeks in December. Distribution system sample pH ranged from 9.3 to 9.7 and alkalinity ranged from 38 to 42 mg/L. No sample results were below DEP limits for this quarter.



Treated Water – Disinfection Effectiveness

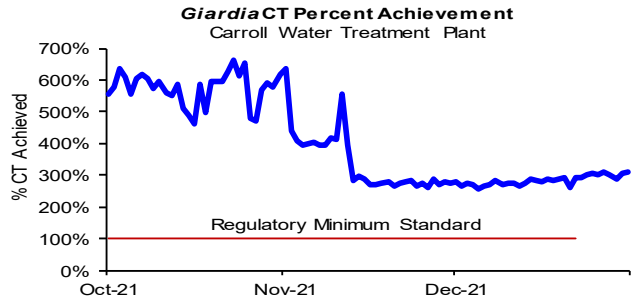
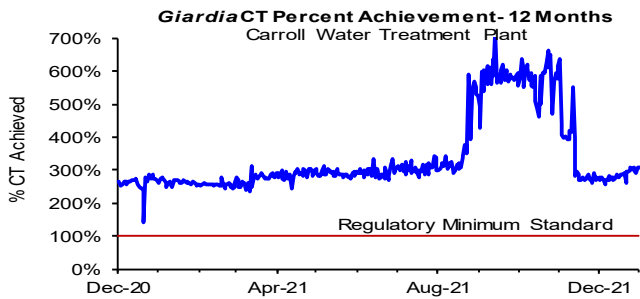
2nd Quarter – FY22

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

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

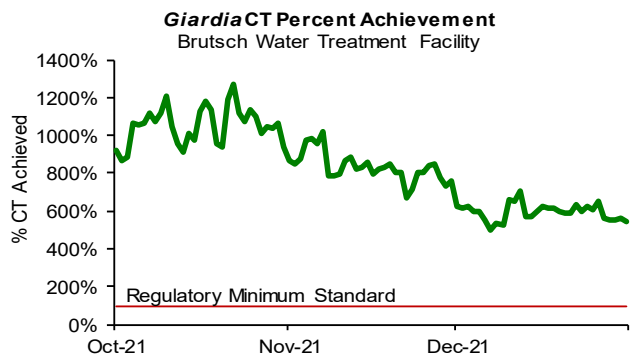
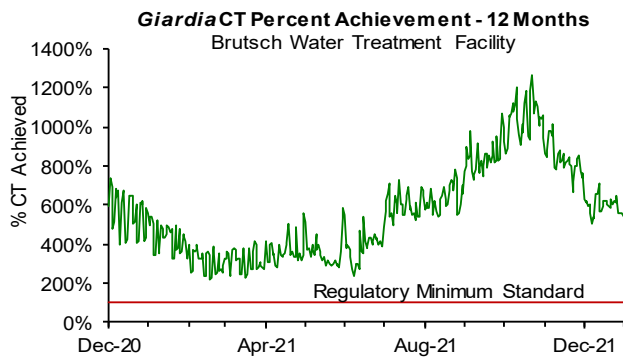
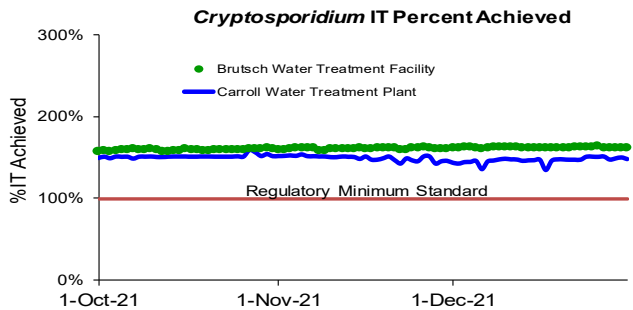
Wachusett Reservoir – MetroWest/Metro Boston Supply:

- Ozone dose at the CWTP varied between 2.4 to 3.9 mg/L for the quarter.
- Giardia* CT was maintained above 100% at all times the plant was providing water into the distribution system this quarter, as well as every day for the last fiscal year.
- Cryptosporidium* IT was maintained above 100% for the quarter. Off-spec water was less than 5%.
- The slight dip in *Giardia* CT Achievement on December 21, 2020 was due to Train B returning to service after undergoing winter maintenance. *Giardia* CT Achievement was met this day. This is visible in the top left graph.
- The ozone target was increased in mid-August 2021 through early November to reduce chlorine demand and decay, as during this time chlorine residuals declined in the distribution system.



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 - 0.85 mg/L (November 1 – May 31) and 0.85 - 1.05 mg/L (June 1 – October 31) at Ludlow Monitoring Station.
- The chlorine dose at BWTF varied between 1.45 to 1.70 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% for the quarter. Off-spec water was less than 5%.



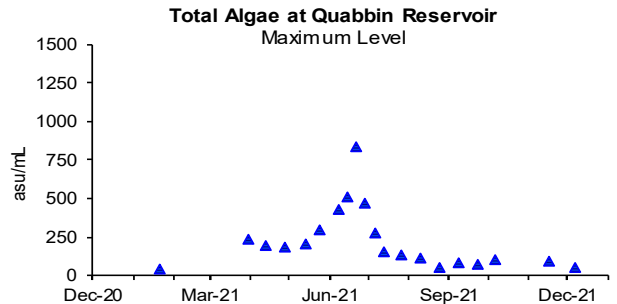
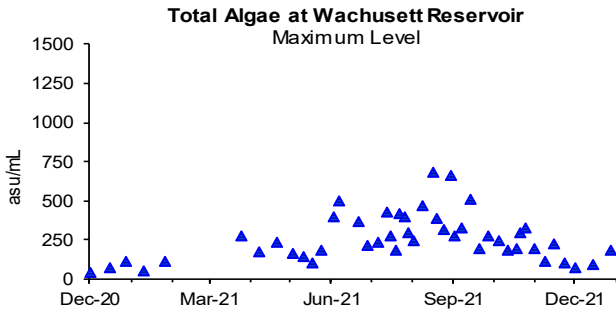
Source Water - Algae

2nd Quarter – FY22

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, there were no complaints which may be related to algae reported from the local water departments.



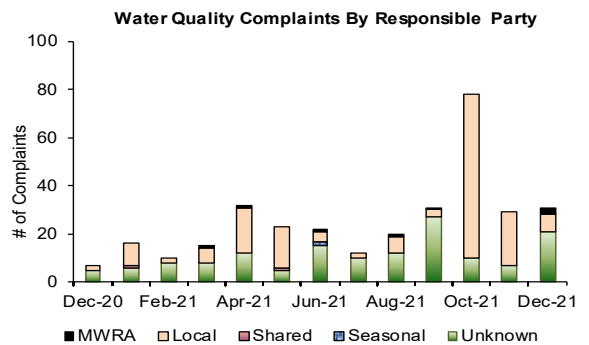
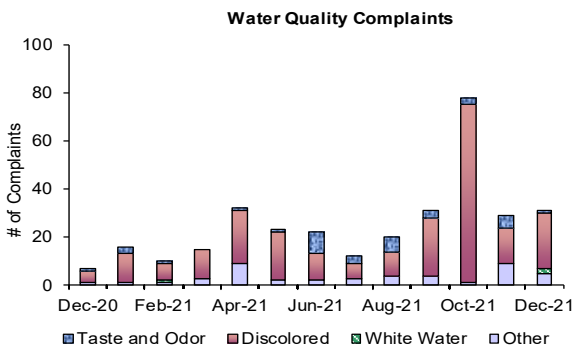
Drinking Water Quality Customer Complaints: Taste, Odor, or Appearance

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 138 complaints during the quarter compared to 28 complaints from 2nd Quarter of FY21. Of these complaints, 112 were for "discolored water", 9 were for "taste and odor", 2 were for "white water", and 15 were for "other". Of these complaints, 97 were local community issues, 3 were MWRA related, and 38 were unknown in origin.

- During October, Arlington reported sixty-three discolored water complaints which may have been related to water hydrant flushing in the area.



Bacteria & Chlorine Residual Results for Communities in MWRA Testing Program 2nd Quarter – FY22

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*). *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.

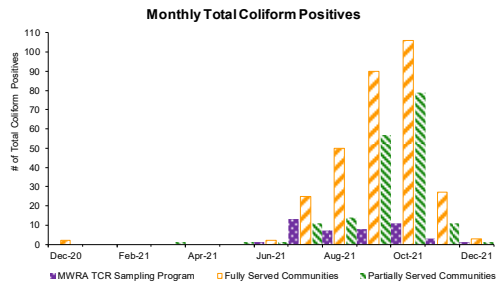
A disinfectant residual is intended to maintain the sanitary integrity of the water; MWRA considers a residual of 0.2 mg/L a minimum target level at all points in the distribution system.

Highlights

In the 2nd Quarter, two hundred and twenty-seven of the 6,931 samples (3.28% system-wide) submitted to MWRA labs for analysis tested positive. Eleven communities were required to perform a Level Assessment. (Bedford, Boston, Chelsea, Everett, Melrose, Needham, Stoneham, Wakefield, Waltham, Winthrop – October; Bedford, Chelsea, Wakefield, Winchester, Winthrop – November; Winthrop - December). Fifteen of the 1928 MWRA locations or Community/MWRA Shared samples (0.78%) tested positive for total coliform. No samples tested positive for *E.coli*. Only 1.9% of the Fully Served community samples had chlorine residuals lower than 0.2 mg/L for the quarter.

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.
- Wakefield's sample collection begins October 4.



		Total Coliform		<i>E.coli</i> Positive	# Assessment Required
		# Samples (b)	# (%) Positive		
MWRA	MWRA Locations	357	1 (0.28%)	0	
	Shared Community/MWRA sites	1571	14 (0.89%)	0	
	Total: MWRA	1928	15 (0.78%)	0	No
Fully Served	ARLINGTON	156	0 (0%)	0	
	BELMONT	104	0 (0%)	0	
	BOSTON	817	16 (1.96%)	0	Yes
	BROOKLINE	227	1 (0.44%)	0	No
	CHELSEA	187	10 (5.35%)	0	Yes
	DEER ISLAND	52	0 (0%)	0	
	EVERETT	181	10 (5.52%)	0	Yes
	FRAMINGHAM	243	2 (0.82%)	0	No
	LEXINGTON	123	1 (0.81%)	0	No
	LYNNFIELD	21	1 (4.76%)	0	No
	MALDEN	248	5 (2.02%)	0	No
	MARBLEHEAD	72	0 (0%)	0	
	MARLBOROUGH	126	0 (0%)	0	
	MEDFORD	195	1 (0.51%)	0	No
	MELROSE	135	8 (5.93%)	0	Yes
	MILTON	102	0 (0%)	0	
	NAHANT	30	0 (0%)	0	
	NEWTON	276	0 (0%)	0	
	NORTHBOROUGH	48	0 (0%)	0	
	NORWOOD	100	0 (0%)	0	
	QUINCY	354	0 (0%)	0	
	READING	136	2 (1.47%)	0	No
	REVERE	198	1 (0.51%)	0	No
	SAUGUS	104	0 (0%)	0	
	SOMERVILLE	252	0 (0%)	0	
	SOUTHBOROUGH	30	0 (0%)	0	
	STONEHAM	106	8 (7.55%)	0	Yes
	SWAMPSCOTT	52	0 (0%)	0	
	WALTHAM	232	9 (3.88%)	0	Yes
	WATERTOWN	130	0 (0%)	0	
	WESTON	45	0 (0%)	0	
	WINTHROP	120	61 (50.83%)	0	Yes
	Total: Fully Served	5202	136 (2.61%)	0	
Partially Served	BEDFORD	99	48 (48.48%)	0	Yes
	BURLINGTON	129	1 (0.78%)	0	No
	CANTON	92	1 (1.09%)	0	No
	NEEDHAM	132	3 (2.27%)	0	Yes
	PEABODY	209	1 (0.48%)	0	No
	WAKEFIELD (6)	170	29 (17.06%)	0	Yes
	WELLESLEY	113	0 (0%)	0	
	WILMINGTON	90	1 (1.11%)	0	No
	WINCHESTER	97	3 (3.09%)	0	Yes
	WOBURN	198	1 (0.51%)	0	No
Total: Partially Served	1,329	90 (6.77%)	0		
CVA	MWRA CVA Locations	106	0 (0%)	0	
	CHICOPEE	186	0 (0%)	0	
	SOUTH HADLEY FD1	63	1 (1.59%)	0	No
	WILBRAHAM	45	0 (0%)	0	
Total: CVA	400	1 (0.25%)	0		
Total: Community Samples	6931	227 (3.28%)	0		

Chlorine Residuals in Fully Served Communities

	2020	2021											
	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
% <0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.3	0.7	0.9	0.5	0.4
% <0.2	0.4	0.2	0.1	0.0	0.0	0.0	0.2	0.7	1.3	2.8	3.1	1.7	0.8
% <0.5	2.5	1.9	0.8	0.2	0.3	0.2	0.6	2.6	6.0	12.3	10.9	7.4	2.8
% <1.0	5.3	3.6	2.5	1.5	2.0	1.0	2.1	8.6	17.3	27.9	26.2	15.7	7.3
% ≥1.0	94.7	96.5	97.6	98.5	98.0	99.0	97.9	91.4	82.7	72.1	73.8	84.4	92.7

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

2nd Quarter – FY22

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.

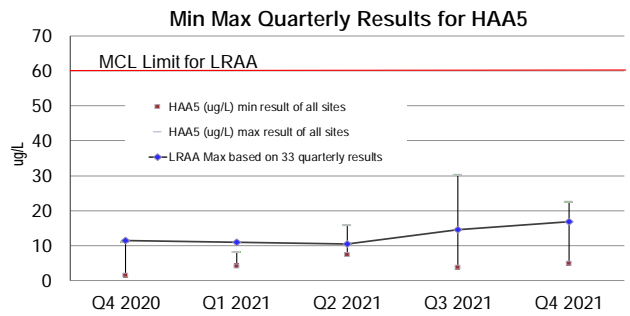
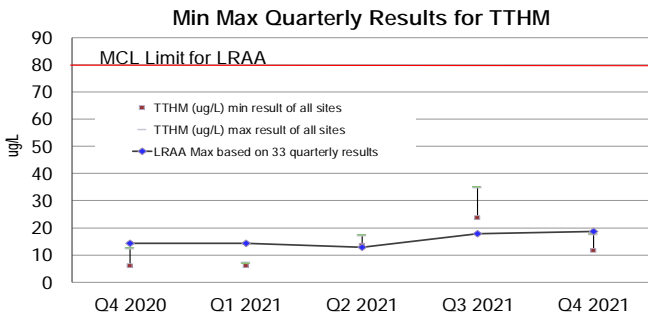
The locational running annual average calculated quarterly at each individual sampling location must be below the Total HAA5 or Total TTHM MCL standard. The charts below show the highest and lowest single values for all sites, and the LRAA of the highest location each quarter.

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). Each community is regulated individually.

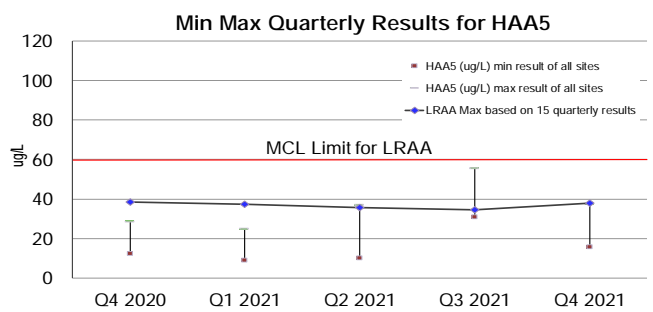
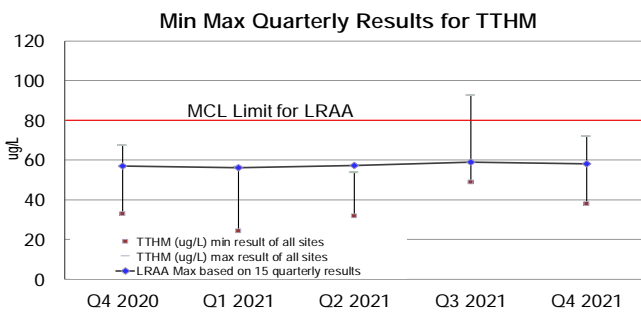
Bromate is tested monthly as required for water systems that treat with ozone. Bromide in the raw water may be converted into bromate following ozonation. EPA’s RAA MCL standard for bromate is 10 µg/L.

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 = 18.6 µg/L; HAA5s = 16.8 µg/L. The current RAA for Bromate = 0.0 µg/L No LRAA exceedances or violations occurred this quarter for MetroBoston and any of the CVA communities. MWRA and the CVA communities continue to closely monitor and manage the disinfection process to minimize DBP production.

MetroBoston Disinfection By-Products



CVA Disinfection By-Products (Combined Results)



Water Supply and Source Water Management

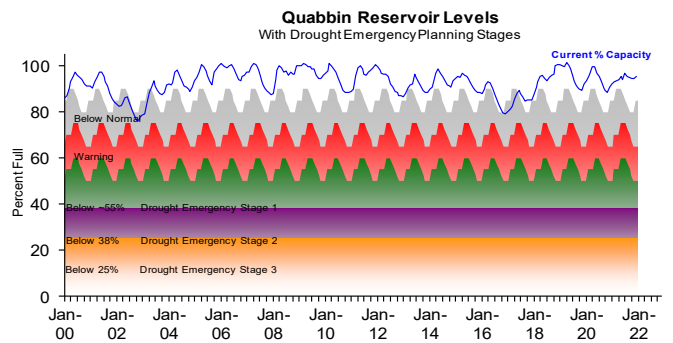
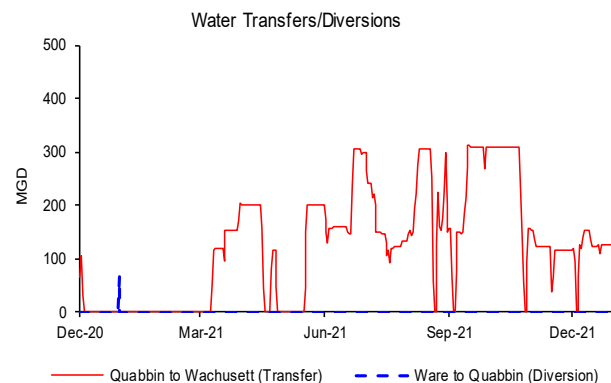
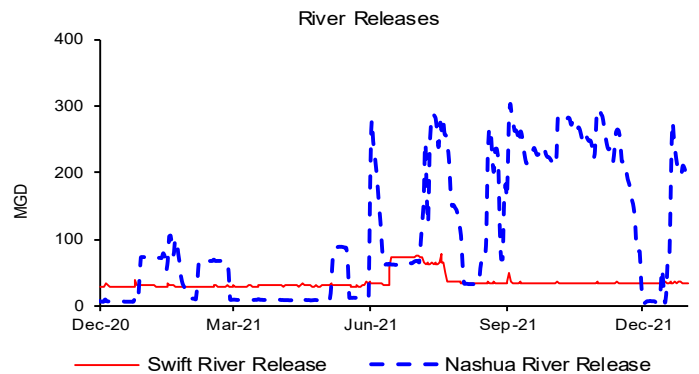
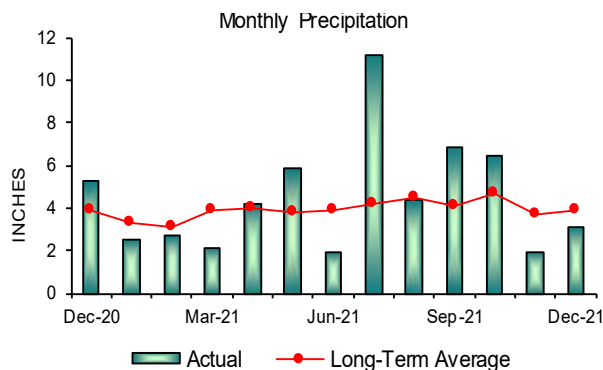
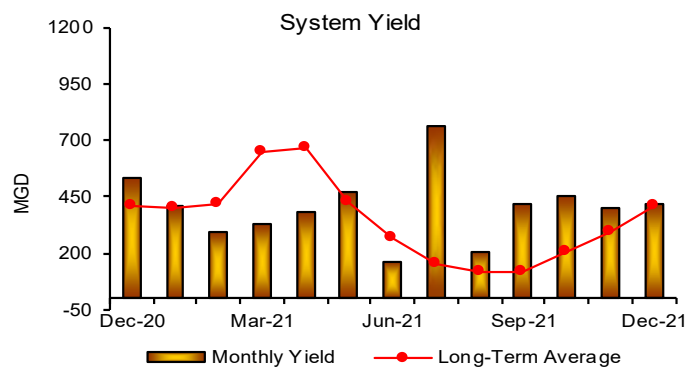
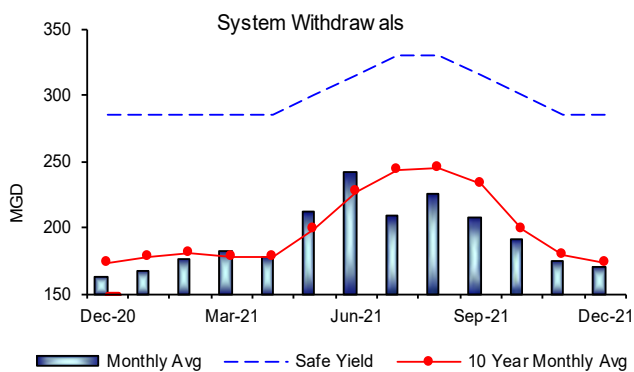
2nd Quarter – FY22

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 95.2% as of December 31, 2021; a 0.50 % increase for the quarter, which represents a gain of more than 1.9 billion gallons of storage and an increase in elevation of 0.26'. System withdrawal and precipitation were below their long term quarterly average. Yield for the quarter was above its long term quarterly average. Quabbin is in Normal Operating Range for this time of year.



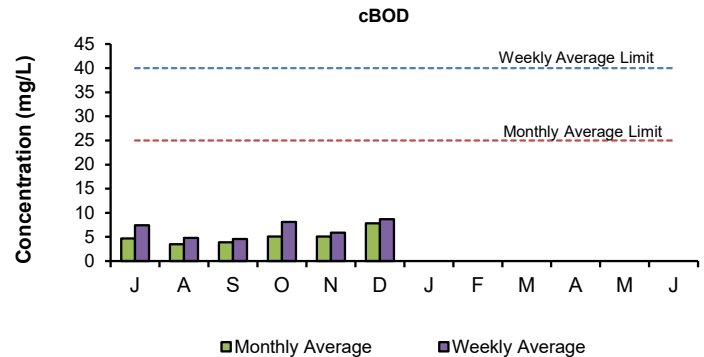
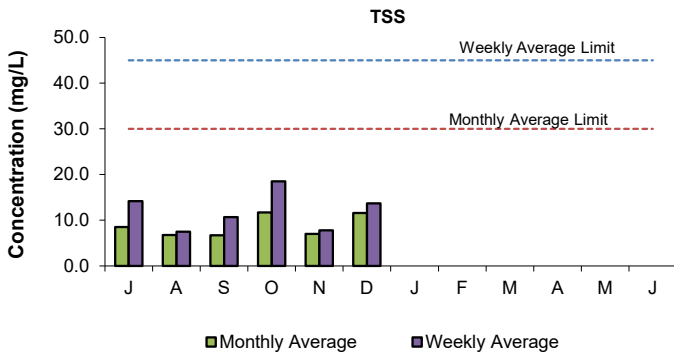
WASTEWATER QUALITY

NPDES Permit Compliance: Deer Island Treatment Plant 2nd Quarter - FY22

NPDES Permit Limits

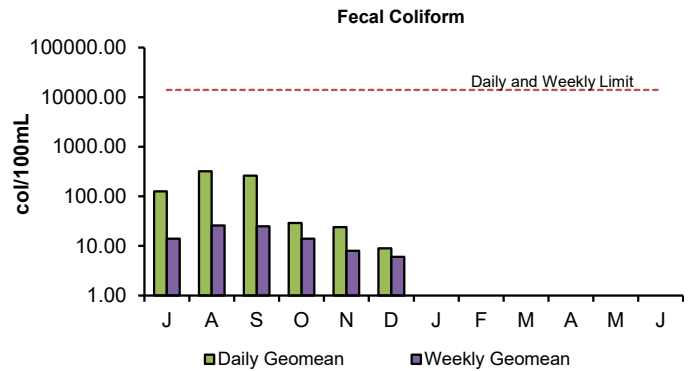
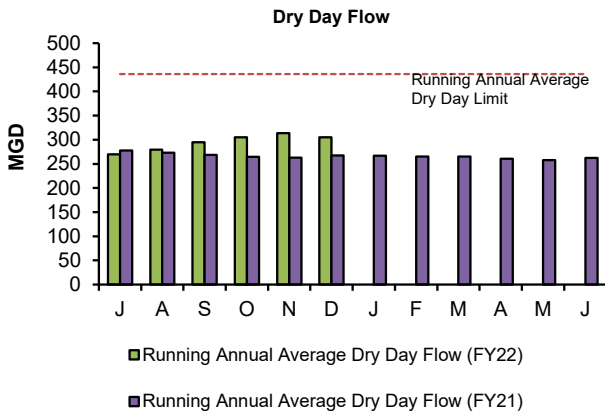
Effluent Characteristics	Units	Limits	October	November	December	2nd Quarter Violations	FY22 YTD Violations
Dry Day Flow (365 Day Average):	mgd	436	304.9	313.6	305.0	0	0
cBOD:	Monthly Average	mg/L	5.1	5.1	7.8	0	0
	Weekly Average	mg/L	8.1	5.9	8.7	0	0
TSS:	Monthly Average	mg/L	11.7	7.0	11.6	0	0
	Weekly Average	mg/L	18.5	7.8	13.7	0	0
TCR:	Monthly Average	ug/L	456	0.0	0.0	0	0
	Daily Maximum	ug/L	631	0.0	0.0	0	0
Fecal Coliform:	Daily Geometric Mean	col/100mL	14000	29	24	9	0
	Weekly Geometric Mean	col/100mL	14000	14	8	6	0
	% of Samples >14000	%	10	0	0	0	0
	Consecutive Samples >14000	#	3	0	0	0	0
pH:	SU	6.0-9.0	6.5-6.9	6.5-7.0	6.4-7.1	0	0
PCB, Aroclors:	Monthly Average	ug/L	UNDETECTED			0	0
Acute Toxicity:	Mysid Shrimp	%	≥50	>100	>100	>100	0
	Inland Silverside	%	≥50	>100	>100	>100	0
Chronic Toxicity:	Sea Urchin	%	≥1.5	50	100	100	0
	Inland Silverside	%	≥1.5	100	50	50	0

There have been no permit violations in FY22 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 - FY22

NPDES Permit Limits

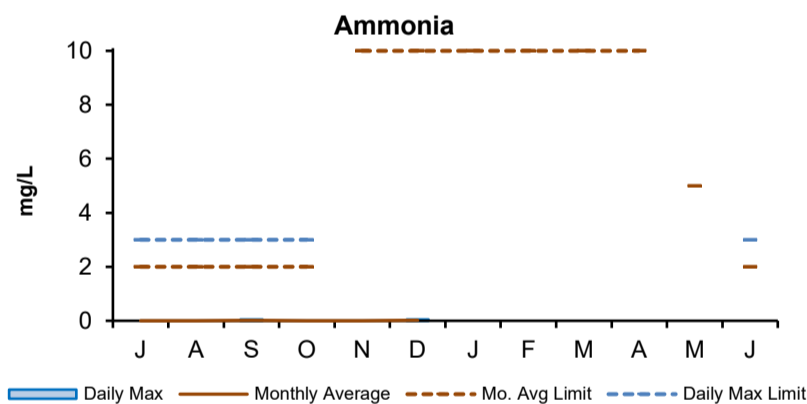
Effluent Characteristics		Units	Limits	October	November	December	2nd Quarter Violations	FY22 YTD Violations
Flow:	12-month Rolling Average:	mgd	3.01	3.03	3.19	3.15	3	3
BOD:	Monthly Average:	mg/L	20	1.20	0.80	3.50	0	0
	Weekly Average:	mg/L	20	1.70	1.70	3.80	0	0
TSS:	Monthly Average:	mg/L	20	1.60	0.90	4.30	0	0
	Weekly Average:	mg/L	20	1.60	1.70	4.50	0	0
pH:		SU	6.5-8.3	7.2-7.6	7.1-7.9	7.1-7.6	0	0
Dissolved Oxygen:	Daily Average Minimum:	mg/L	6	8.90	9.50	10.00	0	0
E. Coli:	Monthly Geometric Mean:	cfu/100mL	126	5	5	6	0	0
	Daily Geometric Mean:	cfu/100mL	409	7	18	16	0	0
TCR:	Monthly Average:	ug/L	17.6	0.00	0.00	0.13	0	0
	Daily Maximum:	ug/L	30.4	0.00	0.00	4.00	0	0
Copper:	Monthly Average:	ug/L	11.6	7.12	6.62	10.52	0	0
	Daily Maximum:	ug/L	14.0	7.12	6.62	11.40	0	0
Total Ammonia Nitrogen: November 1st - March 31st	Monthly Average:	mg/L	10.0	0.00	0.00	0.02	0	0
	Daily Maximum:	mg/L	35.2	0.00	0.00	0.04	0	0
Total Phosphorus: November 1st - March 31st	Monthly Average:	ug/L	1000	31	236	525	0	0
	Daily Maximum:	ug/L	RPT	41	593	691	0	0
Acute Toxicity ⁺ :	Daily Minimum:	%	≥100	N/A	N/A	>100	0	0
Chronic Toxicity ⁺ :	Daily Minimum:	%	≥62.5	N/A	N/A	62.5	0	0

There have been three permit violations at the Clinton Treatment Plant in FY22.

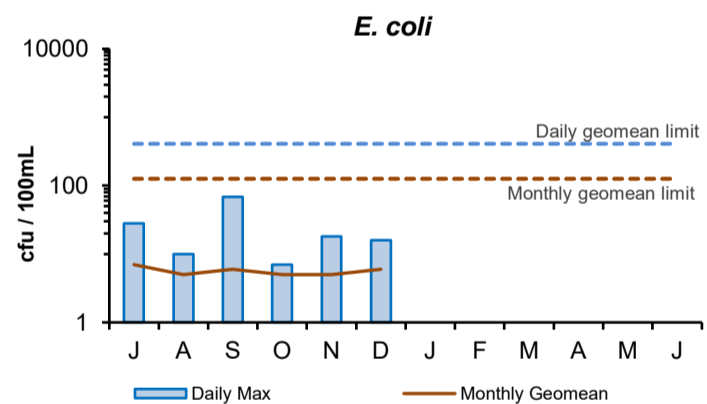
1st Quarter: There were no permit violations in the first quarter.

2nd Quarter: There were three permit violations in the second quarter, all rolling average flow exceedances. The 12-month rolling average flow exceeded 3.01 MGD in the 2nd quarter due to excessive rains in the region during summer 2021.

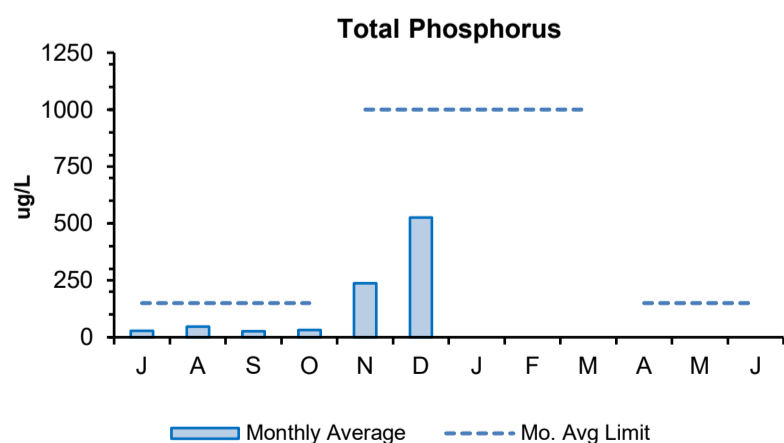
+ Toxicity testing at the Clinton Treatment Plant is conducted on a quarterly basis.



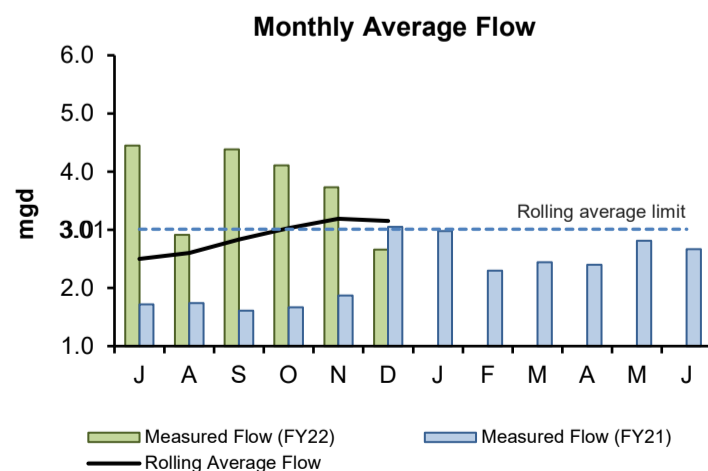
The 2nd Quarter's monthly average and daily maximum concentrations of ammonia were below the permit limits. The monthly average and daily maximum limits for the 2nd Quarter are variable. The permit limits are most stringent from June to October when warm weather conditions are most conducive to potential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



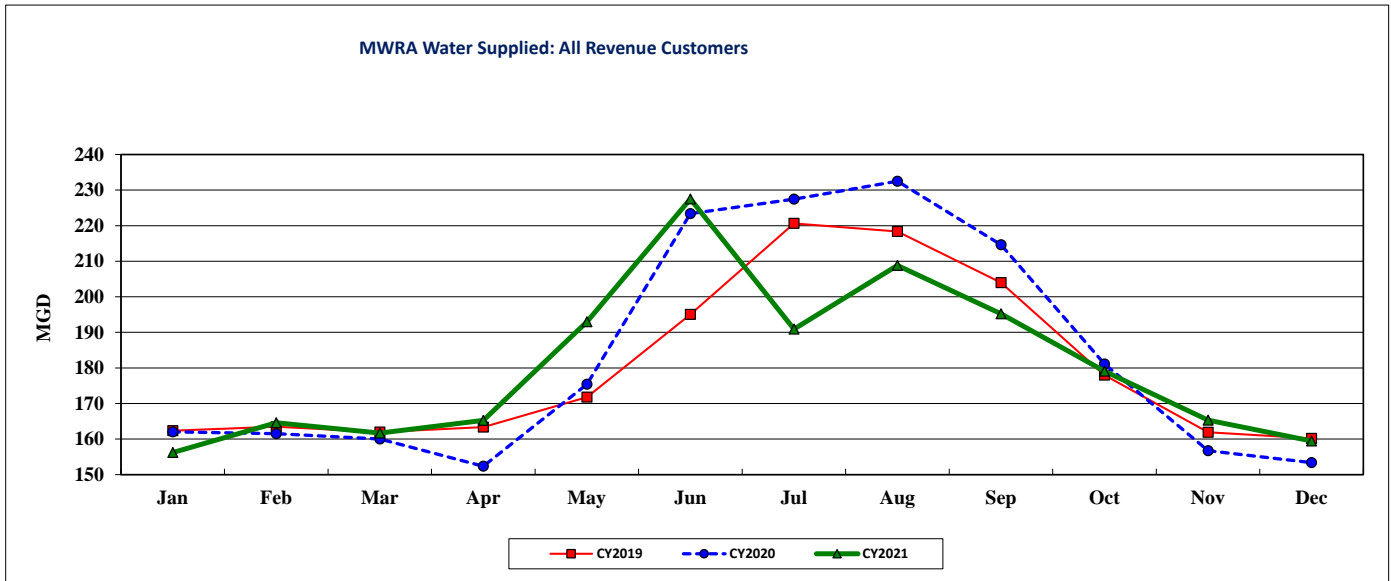
Total phosphorus limits are most stringent during the growing season from April to October. The 2nd Quarter's monthly average concentrations for total phosphorus were below permit limits.



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 above the permit limit.

COMMUNITY FLOWS AND PROGRAMS

Customer Water Use 2nd Quarter - FY22



MGD	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD Average	Annual Average
CY2019	162.367	163.492	161.984	163.350	171.773	195.025	220.621	218.376	203.996	177.998	161.941	160.207	180.220	180.220
CY2020	162.016	161.551	160.018	152.368	175.435	223.405	227.454	232.496	214.617	181.110	156.727	153.367	183.462	183.462
CY2021	156.213	164.567	161.697	165.284	192.998	227.522	190.945	208.810	195.229	179.116	165.302	159.442	180.641	180.641

The December 2021 Community Water Use Report was recently distributed to communities served by the MWRA Metropolitan and Chicopee Valley 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 2021 water use will be used to allocate the FY2023 water utility rate revenue requirement.

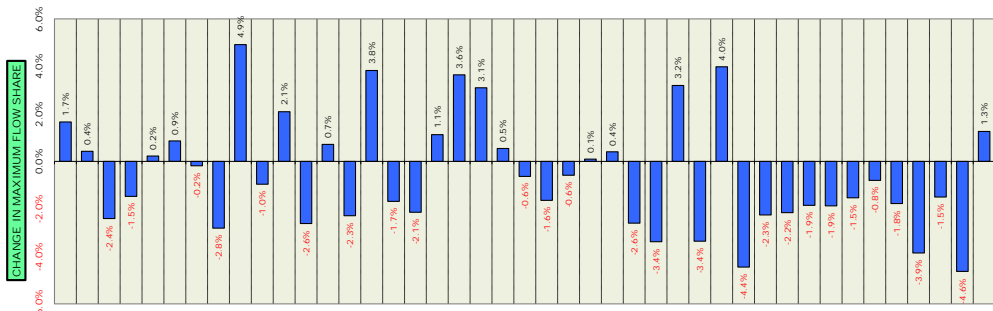
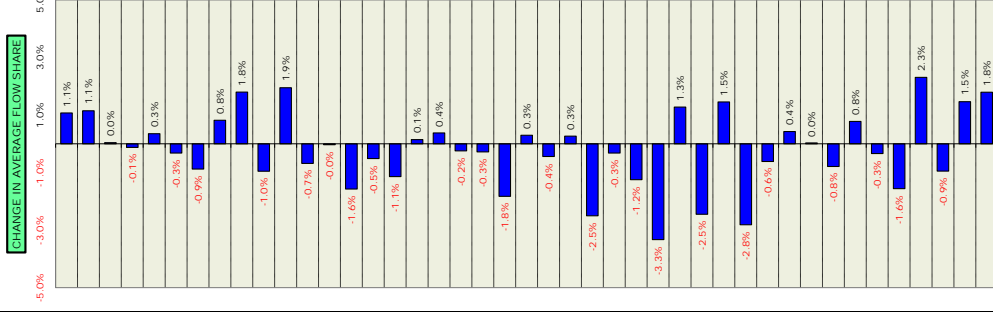
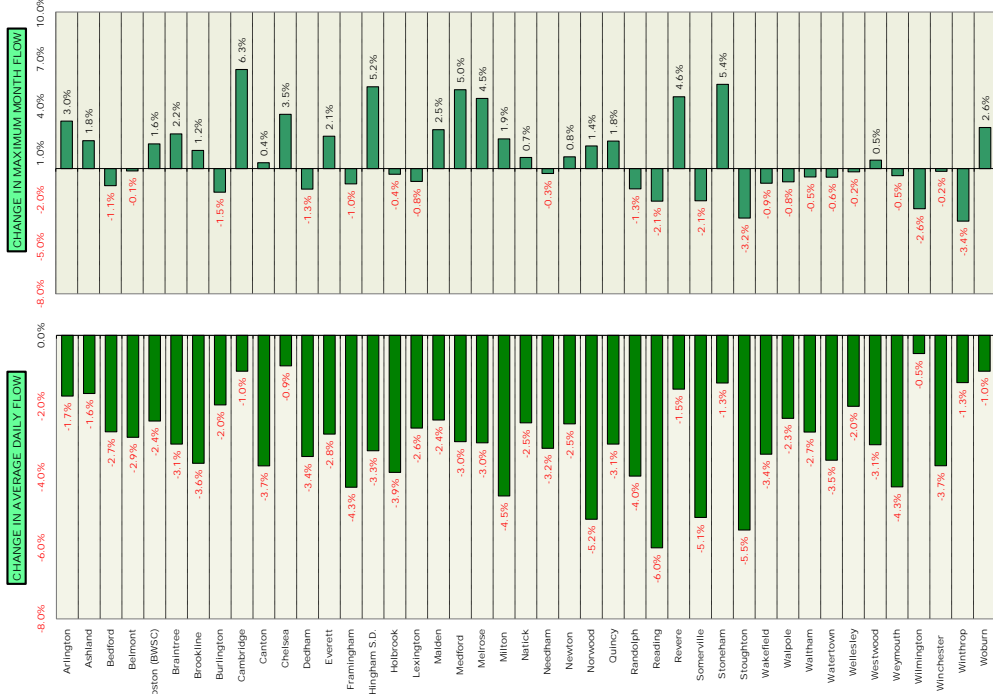
MWRA customers used an average of 167.98 mgd in the 2nd quarter (Oct-Dec 2021) of FY2022. This is an increase of 4.17 mgd or 2.5% compared to the 2nd quarter of FY2021.

Community Wastewater Flows

2nd Quarter - FY22

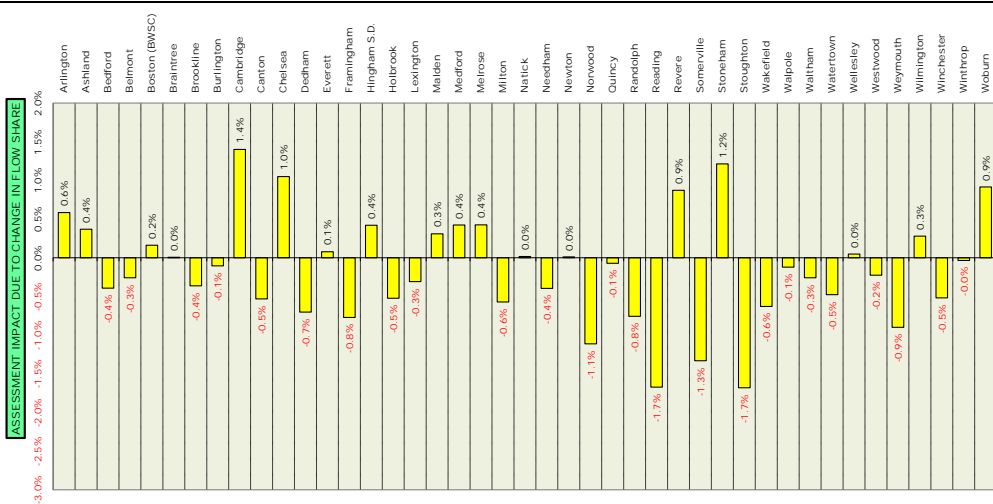
How CY2019-21 Community Wastewater Flows Could Effect FY2023 Sewer Assessments

The flow components of FY2023 sewer assessments will be calculated using a 3-year average of CY2019 to CY2021 wastewater flows compared to FY2022 assessments that will use a 3-year average of CY2018 to CY2020 wastewater flows.



But as MWRA's sewer assessments are a ZERO-SUM calculation, a community's assessment is strongly influenced by the RELATIVE change in CY2019 to CY2021 flow share compared to CY2018 to CY2020 flow share, compared to all other communities in the system.

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



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 actual flows for 2018 and 2019, and January to March, and June to December 2020. April & May 2020 based on the average of three prior years, adjusted for 2020 water use. January to December 2021 estimate based on the average of the three prior years.

³ Flow data is preliminary and subject to change pending additional MWRA and community review.

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

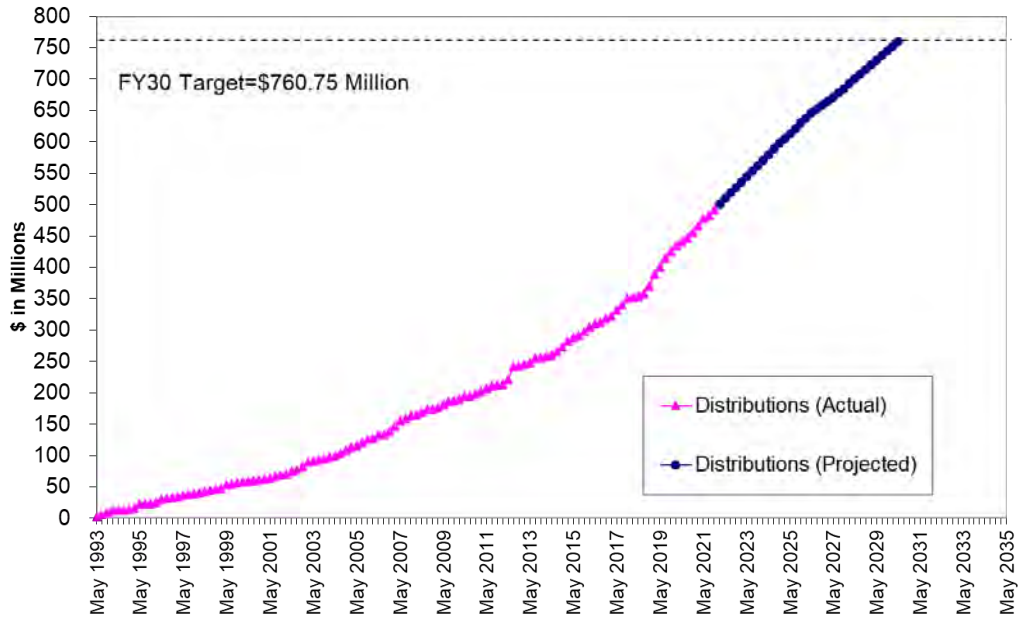
Community Support Programs

2nd Quarter – FY22

Infiltration/Inflow Local Financial Assistance Program

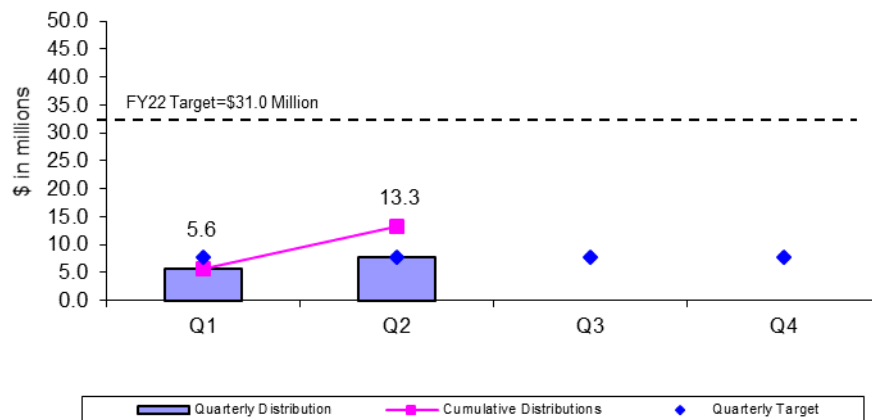
MWRA's Infiltration/Inflow (I/I) Local Financial Assistance Program provides \$760.75 million in grants and interest-free loans (average of about \$20 million per year from FY93 through FY30) to member sewer communities to perform I/I reduction and sewer system rehabilitation projects within their locally-owned 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 ten-year loan-only funds.

I/I Local Financial Assistance Program Distribution FY93-FY30



During the 2nd Quarter of FY22, \$7.7 million in financial assistance (grants and interest-free loans) was distributed to fund local sewer rehabilitation projects in Boston, Revere, Stoneham and Winthrop. Total grant/loan distribution to date for FY22 is \$13.3 million. From FY93 through the 2nd Quarter of FY22, all 43 member sewer communities have participated in the program and \$492 million has been distributed to fund 639 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.

FY22 Quarterly Distributions of Sewer Grant/Loans



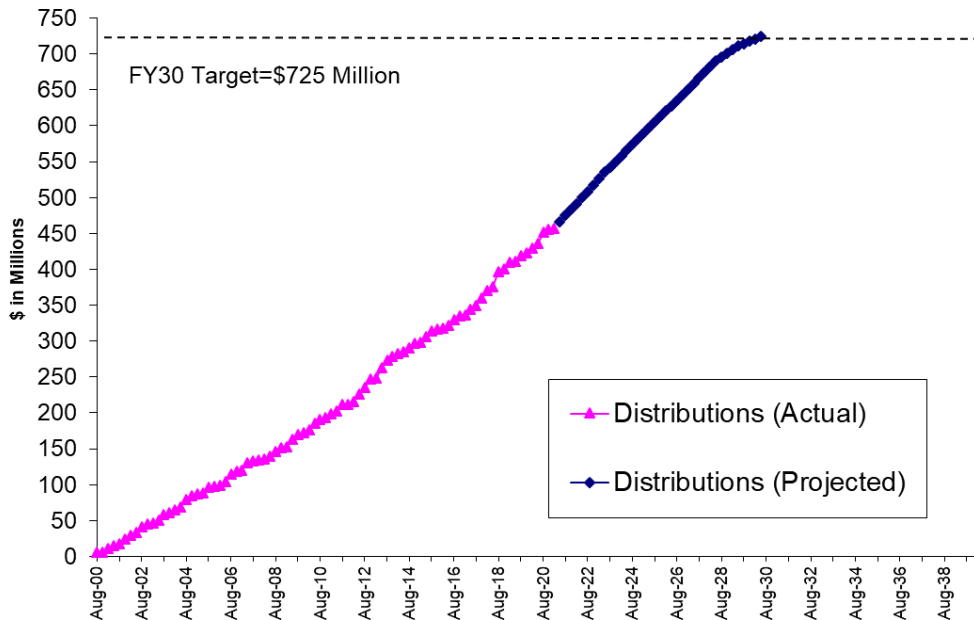
Community Support Programs

2nd Quarter – FY22

Local Water System Assistance Program

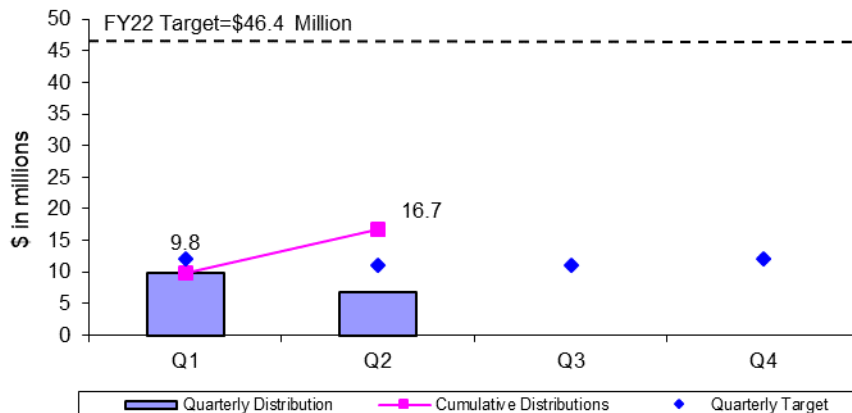
MWRA's Local Water System Assistance Programs (LWSAP) provides \$725 million in interest-free loans (an average of about \$24 million per year from FY01 through FY30) to member water communities to perform water main rehabilitation projects within their locally-owned water distribution systems. There have been 3 phases: Phase 1 at \$222 Million, Phase 2 at \$210 Million, and Phase 3 at \$293 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 FY22, \$6.9 million in interest-free loans was distributed to fund local water projects in Boston, Newton, and Saugus. Total loan distribution to date for FY22 is \$16.7 million. From FY01 through the 2nd Quarter of FY22, \$483 million has been distributed to fund 493 local water system rehabilitation projects in 43 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.

FY22 Quarterly Distributions of Water Loans



Community Support Programs

2nd Quarter – FY22

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 – MWRA made three Lead Loans.

FY18 was the second year of the Lead Loan Program - MWRA made five Lead Loans.

FY19 was the third year of the Lead Loan Program - MWRA made four Lead Loans.

FY20 was the fourth year of the Lead Loan Program - MWRA made eight Lead Loans.

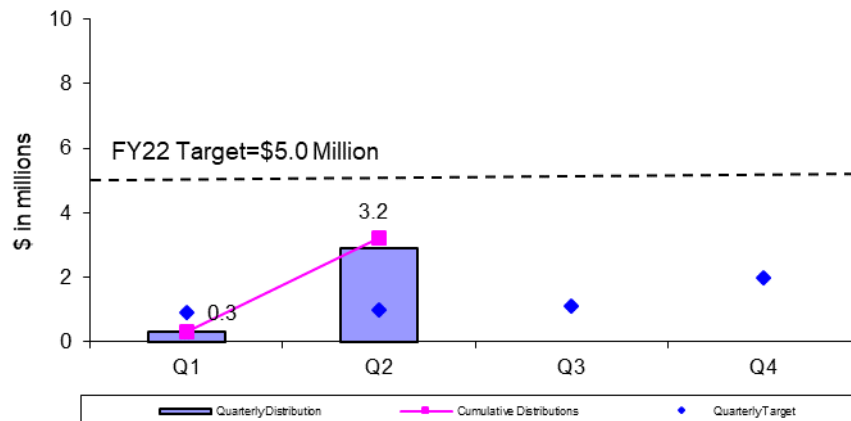
FY21 is the fifth year of the Lead Loan Program – MWRA made seven Lead Loans.

FY22 is the sixth year of the Lead Loan Program – MWRA made three Lead Loans in the first two quarters.

Summary of Lead Loans:

Somerville in FY22	\$1.6 Million	Winthrop in FY18	\$0.3 Million
Revere in FY22	\$1.3 Million	Marlborough in FY18	\$1.0 Million
Chelsea in FY22	\$0.3 Million	Newton in FY17	\$4.0 Million
Watertown in FY21	\$0.6 Million	Quincy in FY17	\$1.5 Million
Marlborough in FY21	\$2.0 Million	<u>Winchester in FY17</u>	<u>\$0.5 Million</u>
Everett in FY21	\$1.5 Million	TOTAL	\$28.4 Million
Boston in FY21	\$2.6 Million		
Winthrop in FY21	\$0.8 Million		
Chelsea in FY21	\$0.3 Million		
Winchester in FY21	\$0.6 Million		
Everett in FY20	\$0.5 Million		
Marlborough in FY20	\$1.0 Million		
Winchester in FY20	\$0.6 Million		
Winthrop in FY20	\$0.7 Million		
Weston in FY20	\$0.2 Million		
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		

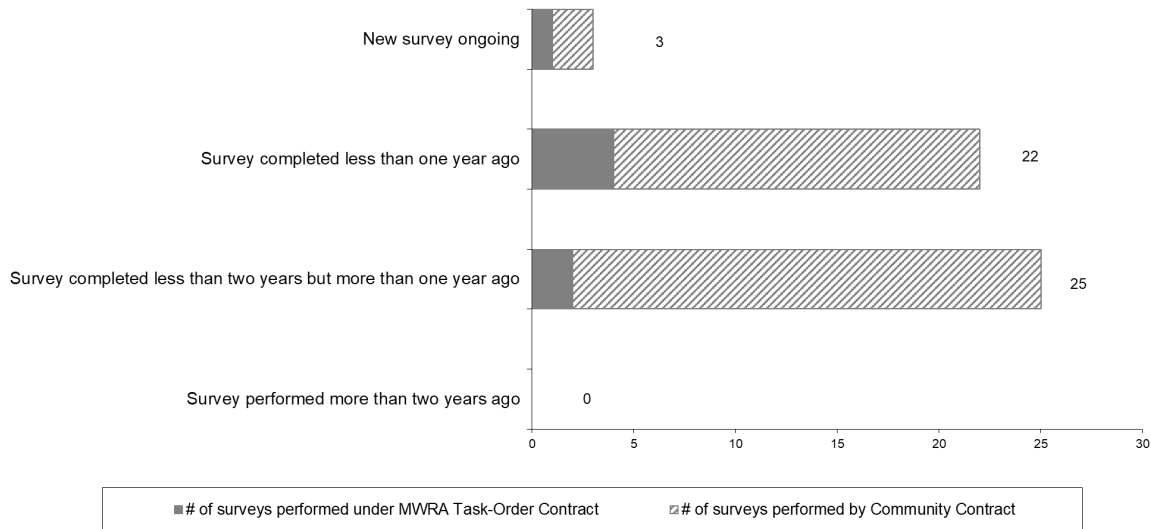
FY22 Quarterly Distributions of Lead Service Line Replacement Loans



Community Support Programs 2nd Quarter – FY22

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 FY22, 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 200 mgd. The local Water Conservation Program includes distribution of water conservation education brochures (indoor - outdoor bill-stuffers) and low-flow water fixtures and related materials (shower heads, faucet aerators, and toilet leak detection dye tabs), 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	732	11,057			11,789
Low-Flow Fixtures (showerheads and faucet aerators)	10,000	1,070	970			2,040
Toilet Leak Detection Dye Tablets	—	1,432	657			2,089

BUSINESS SERVICES

Procurement: Purchasing and Contracts

2nd Quarter - FY22

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 4.85 days vs. 4.30 days in Qtr 2 of FY21. Processed 36% (4 of 11) of contracts within target timeframes; Average Processing Time was 217 days vs. 183 days in Qtr 2 of FY21.

Purchasing



	No.	TARGET	PERCENT IN TARGET
\$0 - \$500	525	3 DAYS	89.9%
\$500 - \$2K	555	7 DAYS	95.8%
\$2K - \$5K	421	10 DAYS	98.0%
\$5K - \$10K	54	25 DAYS	85.1%
\$10K - \$25K	61	30 DAYS	86.8%
\$25K - \$50K	10	60 DAYS	80.0%
Over \$50K	25	90 DAYS	92.0%

The Purchasing Unit processed 1651 purchase orders, 282 less than the 1933 processed in Qtr 2 of FY21 for a total value of \$19,232,725 versus a dollar value of \$10,379,019 in Qtr 2 of FY21.

The purchase order processing target was not met for the \$25K - \$50K category due to staff summary requirements.

Contracts, Change Orders and Amendments

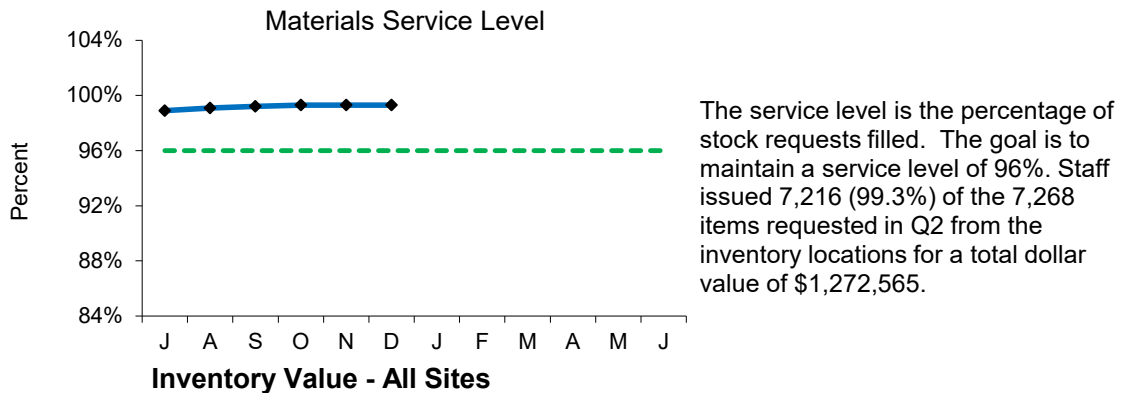
Procurement executed eleven contracts with a value of \$77,728,775 and seven amendments with a value of \$1,303,253. Twenty five change orders were executed during the period. The dollar value of all non-credit change orders during Qtr 2 was \$700,877 and the value of credit change orders was (\$1,197,276).

Seven contracts was not executed within the target timeframes. One contract was delayed due to a change order to extend the existing contract thereby delaying the establishment of the new contract. A second contract was delayed due to specification reviews that took longer than anticipated. Another contract was delayed due to an error in the first ranked proposer's compensation tables which required a review and ultimately led to a rejection. This circumstance led to the review and subsequent approval of the second ranked proposer. A fourth contract was delayed due to additional procurement requirements necessary for insurance services. Insurance for all categories of coverage was obtained timely and according to schedule. Another contract was delayed due to legal requirements between MWRA and National Grid resulting in a negotiated agreement for work occurring near the Hi voltage/Hi power lines. A sixth contract was delayed due to the retirement of the project manager. The final contract was delayed due the additional time required to review and approve the thirty filed sub-bid submissions in addition to the need to re-bid one filed sub-bid category and the review of the general bid results.

Staff reviewed 35 proposed change orders and 31 draft change orders.

Materials Management

2nd Quarter - FY22



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 FY22 goal is to reduce consumable inventory from the July '21 base level (\$8.7 million) by 2.0% (approximately \$175,120), to \$8.5 million by June 30, 2022.

Items added to inventory this quarter include:

- Deer Island – cables, power supplies, coupling pads, transmitter, comb sensor, flow blocks, moisture barriers, and proximity switches for I&C; pillow block bearings, hose pumps, pressure sensors, and VFD cards for Power & Pump; gate controller and gate arm for Security; hydraulic filters for Fleet Services; microwave and computer stands for plant-wide departments.
- Chelsea – data logger, output card, power cords, cables, network box, sensors, wall mount kit, module battery and velocity sensor cable for Metering; printheads and plotter maintenance cartridges for Procurement; labels for Security; filter frames, clips and neoprene wheels for Planning.
- Southboro – filters and v-belts for Maintenance; illuminators for all Trades.

Property Pass Program:

- Fourteen audits were conducted during Q2.
- Scrap revenue received for Q2 amounted to 11,172. Year to date revenue received amounted to \$25,463.
- Revenue received from online auctions held during Q2 amounted to \$94,555. Year to date revenue received amounted to \$462,957.

Items	Base Value July-21	Current Value w/o Cumulative New Adds	Reduction / Increase To Base
Consumable Inventory Value	8,756,035	8,788,582	32,547
Spare Parts Inventory Value	9,317,998	9,278,255	-39,743
Total Inventory Value	18,074,033	18,066,837	-7,196

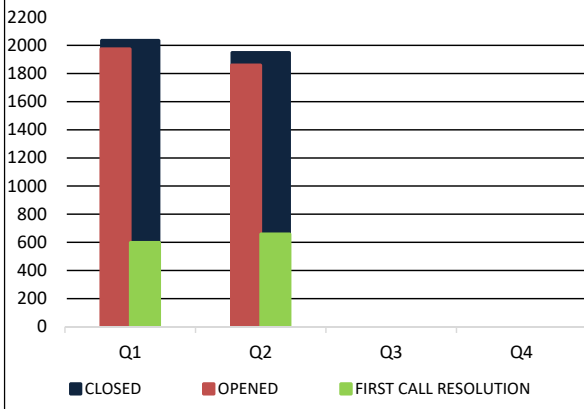
Note: New adds are items added at an inventory location for the first time for the purpose of servicing a group/department to meet their business needs/objectives.

MIS Program

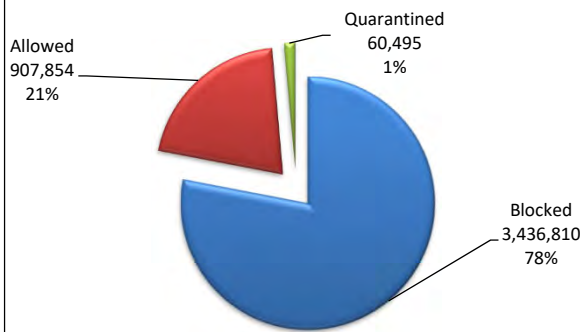
Second Quarter – FY22

Numbers & Statistics

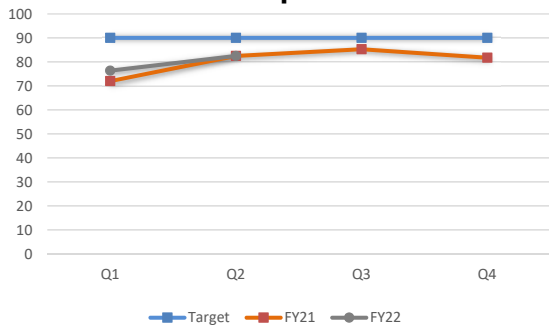
Monthly Call Volume



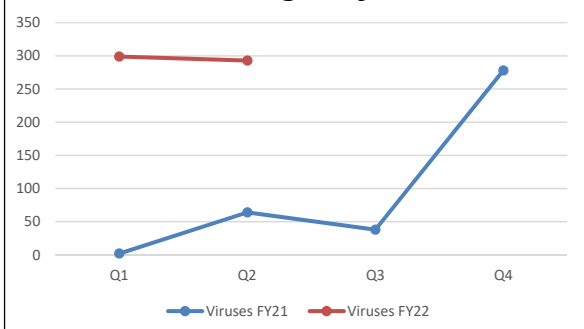
Emails Received: 4,405,159



PC Compliance



Viruses Caught by McAfee



Project Updates

Infrastructure & Security

AWIA Risk and Resiliency Assessment: Remediation work to resolve vulnerabilities continued. At the end of the quarter, 66% of the identified tasks were “Completed”; 1% were “In Progress”; and 33% were identified as longer term projects.

Cyber Security Awareness Training: At the end of the quarter, all employees had completed their assigned training.

PBX (Telephone System) Upgrade: Planning and infrastructure upgrades for the installation, configuration, and roll-out of the new phones continued. SIP trunk provisioned by VZB and successfully tested at Chelsea and DITP. Working with VZB on preparing deployment, which is planned for Q3.

Identity and Access Management: Implementation of the Okta single sign-on (SSO) solution was started during Q2 and is targeted to complete in Q3. Initial integrations will be with Webex, and LMS.

Next Managed Security Services Contract: Procurement of required firewalls and software is underway. The Scope of Services for this RFQ/P was started during this quarter and anticipate the SOW going to procurement in February.

Digital Displays: Site visits have been conducted to survey display locations and cabling requirements. Hardware have been procured and will be installed pending completion of cabling.

Other Software & Custom Applications

ECM/Electronic Document Management: Multiple meetings on physical records management file structure and DISC CAD standards. Held meetings to reconcile and standardize the list of MWRA Facilities and their associated codes leveraging GIS and Maximo data. Analysis continued on InfoStar reporting, File Structures, historical drawing duplicates, and current business workflows. Continued to refine and build technical infrastructure, focusing on disaster recovery and availability.

MWRA Website Replacement: The website replacement project was put out to bid and closed. Neither bidder met requirement for an on-premises solution. The SOW is being rewritten to include option for cloud solutions for reposting.

Learning Management System: Functional and User Acceptance Testing (UAT) complete. Course history and license/certificate history imported into new system. Administrator Job Aid in progress. Planned go-live in late February or early March.

OMMS Communities Upgrade: Work on the OMMS Website replacement continued in Q2. The first two communities (Boston, Brookline) are expected to be deployed by the end of January, with the remaining deployed in February and March.

HOML: Upgrade of the HOML continues development with additional security requirements. Anticipated completion the end of Q3.

CROMERR: All development work on has been completed.

Library, Record Center, & Training

Library: Undertook 25 research requests, supplied 19 books for circulation, provided 15 articles, and 3 standards. The MWRA Library Portal supported 13172 end-user searches. Research topics include Northfield Water Supply Project, original CSO flow volume, change in allowed CSO activations at Somerville Marginal, CSO program affordability analysis, Wachusett Dam Pool historic discharge tables.

Record Center (RC): The Record Center added 182 new boxes, handled 282 total boxes, and shredded (14) 65 gallon bins of confidential documentation on-site. It performed 45 database/physical box searches for multiple departments on various topics, which saved the delivery of 28 boxes. The RC was able to dispose 178 archived boxes stored at the RC adhering to appropriate approvals.

Training: Training: In Q2, 60 online IT lessons were taken, by 14 employees, spanning 76 hours (208 YTD). 22 total sessions of 5 standard class lessons were taken by 33 employees, spanning 305 hours.

Legal Matters

2nd Quarter - FY22

PROJECT ASSISTANCE

Real Estate, Contract, Environmental and Other Support:

8(m) Permits and Licenses:

Reviewed one hundred and five (105) 8(m) permits and one (1) Direct Connection Permit. Drafted Reservoir Manor Corporation 8(m) permit for the use of certain Quincy High Level Sewer property off of Sea Street in Quincy under MWRA's care, custody and control, 8(m) permit for 12 Cleverly Court and use by the City of Quincy for a laydown site for placement of sediments from pond dredging, and 8(m) permit for Montvale, LLC for the use of an easement area under MWRA's care, custody and control in the Town of Winchester and the City of Woburn. Drafted licenses for Paul Revere Transportation, LLC, Urban Growth Property, LP, and Eastern Condominium Trust relative to MWRA's installation of traffic signals on Eastern Avenue in Chelsea. Drafted amendments to public access permits for the City of Marlborough and the Town of Southborough. Finalized license for Massachusetts Institute of Technology for use of certain areas of Deer Island Waste Water Treatment Plant for the purpose of testing a passive camera system.

Real Property:

Drafted temporary and permanent water easements in Woburn related to MWRA Contract 7117 - Northern Intermediate High Section 89 Replacement Pipeline. Reviewed proposed edits to 12 Cleverly Court Memorandum of Agreement between MWRA and Quincy. Finalized review of DCR's Wachusett Watershed Preservation Restriction Acquisition W-001223, related to the Thorell property located at 112 Mirick Road in Princeton and made recommendation for payment. Reviewed updated Activity and Use Limitation documents related to Chelsea Creek Headworks. Reviewed plans and drafted grant of permanent water easements relative to new MWRA water meters and water main lines at proposed development in Revere/Boston at site of former Suffolk Downs. Reviewed Order of Taking documents for fee interest and easement regarding the Wachusett Aqueduct and parcels of land in Northbridge along Hudson Street for the Assabet River Bridge to confirm MWRA property rights and surplussing process. Researched and drafted opinion on payment of real property taxes when acquisition is by purchase and eminent domain. Researched and confirmed non-taxable status for prior MWRA property acquisitions by purchase. Researched MWRA land takings and created database for mapping and archiving electronic records. Reviewed documents related to traffic signalization project located at Eastern Avenue/Griffin Way, Chelsea.

Recorded two Certificates of Compliance for MWRA Contract #7505, Southern Extra High Section 111, Dedham South. Confirmed certificate of recording for Waltham Conservation Commission for Order of Conditions for Lexington Street, Waltham. Reviewed updated appraisal with property valuation for property site to support the Tunnel Redundancy Project. Reviewed historic taking documents related to the Deer Island Treatment Plant (DITP) and Nut Island Treatment Plant (NITP) for updating MWRA's electronic database for property

ownership. Researched and reviewed Article 97 for acquisition of property interests for the Tunnel Redundancy Project.

Researched deeds and takings by the Town of Wellesley concerning 125 Barton Road, Wellesley (Hegarty Pump Station).

Energy:

Prepared analysis regarding the of City of Boston's update to its Building Energy Reporting and Disclosure Ordinance (a.k.a., BERDO 2.0). Finalized Interconnection Service Agreement with Eversource for the Charlestown wind turbine facility. Reviewed recent Federal Infrastructure Act for hydropower incentives and applicability to existing and new resources. Assist with policy development regarding employee use of electric vehicle charging stations. Review of studies and related materials regarding potential photo-voltaic systems at MWRA facilities. Review and analysis regrading MWRA hydro facility eligibility in Commonwealth's Small Hydro Net Metering Program. Analyze use of Green Communities Act procurement options in municipal light plant jurisdictions.

Environmental/NPDES:

Prepared summary regarding Chapter 322 of the Acts of 2020 An Act Promoting Awareness Of Sewage Pollution In Public Waters, now codified at M.G.L. c. 21, Section 43A. Assisted with CSO semi-annual report Number Seven. Provided guidance to TRAC division regarding Per- and Poly-fluoroalkyl substances. Assisted with preparation of revisions to comment letter regarding proposed regulations 314 CMR 16.00 Notification Requirements to Promote Public Awareness of Sewage Pollution. Assisted with preparation of communication regarding Contingency Plan threshold exceedance for low dissolved oxygen in Stellwagen Basin. Assist TRAC with sewer use discharge permit and enforcement issues. Review of changes to ASTM Phase I Environmental Site Assessment standards and potential applicability to MWRA real property/environmental programs. Review of Water Quality Standard Variance submittals.

Miscellaneous:

Prepared analysis regarding Section 1441 of the Safe Drinking Water Act and the corresponding emergency chemical procurement provisions and processes. Drafted testimony regarding Massachusetts Senate Bill S.1348, a bill relative to local water and sewer district oversight. Reviewed and revised initial draft Continual Water Supply Agreements for DWWD and Marlborough. Reviewed Chapter 647 of the Acts of 1989 concerning applicability to MWRA. Reviewed Enabling Act pursuant to Project Labor Agreements and ascertained no requirement for legislative nor governor's approval. Reviewed Metrowest Tunnel Supply Project board staff summaries for the Tunnel Redundancy Division. Reviewed MetroWest construction management professional services agreement. Drafted terms for Tunnel Redundancy consultant contract. Reviewed and approved outdated documents for submission to Records Conservation Board for destruction. Reviewed, indexed and archived historical land takings, deeds, releases and easements for mapping and archiving electronic records. Collaborated with Real Property and GIS Divisions to improve

Legal Matters

2nd Quarter - FY22

and expand Real Property/GIS interactive database, including: refining and charting coding, adding and editing taking documents and undertaking quality control to ensure consistency and accuracy in the designation of property interests held by MWRA and property interests conveyed by MWRA. Updated schedule and sequencing of tasks for property acquisitions to support Tunnel Redundancy. Reviewed boring test report and information from the Town of Ludlow for

proposed construction of a new communications tower at Nash Hill. Advised on use of network drives for long-term records retention.

Public Records Requests: During the 2nd Quarter of FY22, MWRA received and responded to one hundred forty three (143) public records requests.

A former employee appealed a Division of Unemployment Assistance (DUA) decision disqualifying him from unemployment benefits. Following a hearing before a Review Examiner, the DUA reversed its initial decision and awarded unemployment benefits. The MWRA has appealed the Review Examiner's decision and the matter is currently under review.

LABOR, EMPLOYMENT AND ADMINISTRATIVE

New Matters

Two demands for arbitration were filed.

A charge was filed at the Massachusetts Commission Against Discrimination alleging that the MWRA discriminated against an employee on the basis of a disability when he was not interviewed for a position.

A union filed a charge of prohibited practice at the Massachusetts Department of Labor Relations alleging the MWRA violated Chapter 150E when it filled a vacant Unit Supervisor position as a Unit 3 (NAGE) position rather than a Unit 2 (AFSCME) position in repudiation of a stipulated agreement between the parties.

Ongoing Matters

The Department of Labor Relations deferred a charge of prohibited practice brought by a union regarding the posting of a position at the Brusch Water Treatment Facility to the parties' grievance-arbitration procedure.

Matters Concluded

Received an arbitrator's decision in favor of the MWRA following a hearing regarding a grievance alleging that it violated a collective bargaining agreement when grievant was suspended.

Received decision in Claimant's favor from the Department of Unemployment Assistance regarding former employee's appeal of the denial of his claim for unemployment benefits.

LITIGATION/CLAIMS

New lawsuits/claims:

Geico a/s/o Abdessamad Marah v. MWRA, Superior Court C.A. No. 2184CV02107

Insurer filed subrogation action seeking \$24,000 for alleged property damage arising out of an August 11, 2020 motor vehicle accident between Claimant and an MWRA vehicle on Eastern Avenue in Chelsea.

Significant

Developments:

(Employee) v. MWRA: Suffolk Superior Court C.A. No. 16-3708E

The Court held a final Pre-Trial Conference and scheduled a trial date of May 17, 2022.

MWRA v. Bharat Bhushan et al, Superior Court C.A. No. 1984CV03586

In November 2021, defendant homeowners completed most restorative work on the affected portion of the Sudbury Aqueduct land pursuant to an approved Section 8(m) permit application. Due to winter conditions, seeding is to proceed in the spring of 2022.

(Employee) v. MWRA: Suffolk Superior Court C.A. No. 21-1434

The parties exchanged written discovery Plaintiff's deposition began on October 12, 2021 and is scheduled to conclude on January 11, 2022.

DiGregorio, et al. v. Griffin Way, LLC v. MWRA,

Suffolk Superior Court C.A. No. 2084-CV-02429-K

Plaintiffs filed an Assented to Motion to Approve Settlement on December 14, 2021. A hearing on the motion has been scheduled for January 7, 2022.

Closed Lawsuits:

There are no closed lawsuits.

Closed Claims:

There are no closed claims.

Legal Matters

2nd Quarter - FY22

Subpoenas

During the Second Quarter of FY 2022, no subpoenas were received but one subpoena was closed during the Second Quarter FY 2022.

Wage Garnishments

There are two wage garnishment matters that are active and monitored by Law Division.

SUMMARY OF PENDING LITIGATION MATTERS

TYPE OF CASE/MATTER	As of Dec 2021	As of Sept 2021	As of June 2021
Construction/Contract/Bid Protest (other than BHP)	0	0	1
Tort/Labor/Employment	5	3	4
Environmental/Regulatory/Other	3	3	2
Eminent Domain/Real Estate	0	1	0
Total	8	7	7
Other Litigation matters (restraining orders, etc.)	2	2	2
Total – all pending lawsuits	10	9	9
Claims not in suit:	0	1	1
Bankruptcy	1	1	1
Wage Garnishment	2	2	2
TRAC/Adjudicatory Appeals	0	0	0
Subpoenas	0	1	0
TOTAL – ALL LITIGATION MATTERS	13	14	13

TRAC/MISC.

New Appeals:

There are no new appeals in the 2nd Quarter FY 2022.

Settlement by Agreement of Parties

There are no Settlements by Agreement of Parties in the 2nd Quarter FY 2022.

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 2022.

Final Decisions

There are no Final Decisions issued in the 2nd Quarter FY 2022.

**INTERNAL AUDIT AND CONTRACT AUDIT ACTIVITIES
2nd Quarter FY22**

Highlights

During the 2nd quarter FY22, Internal Audit (IA) performed a Fleet Inspection review observing the quality of tire treads, Mass State inspection compliance, other inspection compliance [hoists and cranes affixed to utility trucks] and recorded EZ Pass transponder serial numbers. IA provided observations and recommendations and is working with management to enhance controls and procedures to increase inspection compliance. An internal review of water and wastewater licenses and certifications is nearing completion.

In addition, IA supported negotiations and verified costs related to the cross-harbor electric cable replacement (new cable) and HEEC's tariff filing with the DPU, participated in the RFP/Q process to select tax consultant FRRRC, and completed preliminary reviews of 2 professional service contracts while 3 others are in process. IA issued 30 indirect cost rate letters to professional service consultants. Management advisory services included support and analysis on delegation of authority.

Status of Recommendations

During FY22, 19 recommendations were closed.

IA follows-up on open recommendations on a continuous basis. All open recommendations have target dates for implementation. When a recommendation has not been implemented within 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
Asset Tracking – Fleet Data Verification (8/21/19)	1	15	16
Fleet Services Non-Plated Equipment Inspections (3/30/20)	3	12	15
Overhead Crane Inspections (4/28/21)	2	9	11
Compliance Status of Employees' Mandatory Confined Space Entry Training (6/30/21)	<u>7</u>	<u>1</u>	<u>8</u>
Total Recommendations	13	37	50

Cost Savings

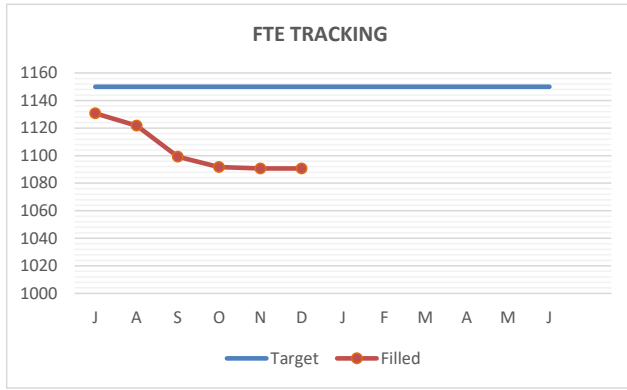
IA's target is to achieve at least \$1,000,000 in cost savings each year. Cost savings vary each year based upon many factors. In some cases, cost savings for one year may be the result of prior years' audits.

Cost Savings	FY18	FY19	FY20	FY21	FY22 Q2	TOTALS
Consultants	\$118,782	\$262,384	\$643,845	\$563,525	\$0	\$1,588,536
Contractors & Vendors	\$1,323,156	\$3,152,884	\$2,097,729	\$1,547,223	\$651,637	\$8,772,629
Internal Audits	\$204,202	\$210,063	\$212,517	\$214,458	\$117,957	\$959,197
Total	\$1,646,140	\$3,625,331	\$2,954,091	\$2,325,206	\$769,594	\$11,320,363

OTHER MANAGEMENT

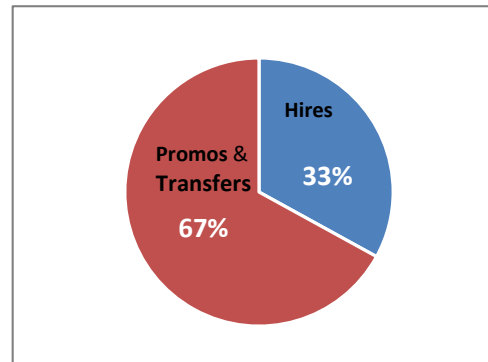
Workforce Management

2nd Quarter - FY22

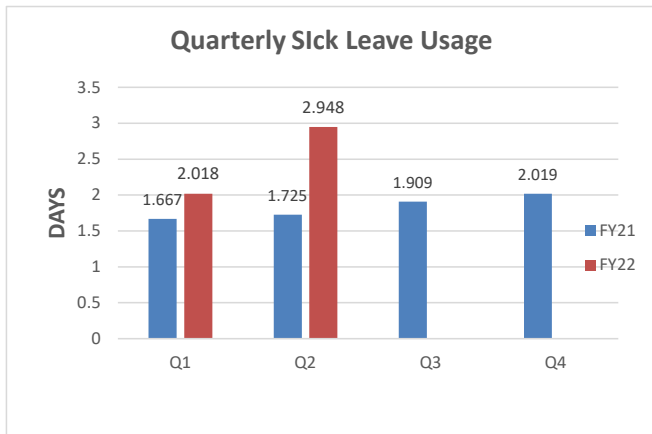


FY22 Target for FTE's = 1150
 FTE's as of December 2021 = 1090.7
 Tunnel Redundancy as of Dec 2021 = 10

Position Filled by Hires/Promos



	Pr/Trns	Hires	Total
FY20	84 (59%)	58 (41%)	142
FY21	81 (56%)	64 (44%)	145
FY22	56 (67%)	28 (33%)	84

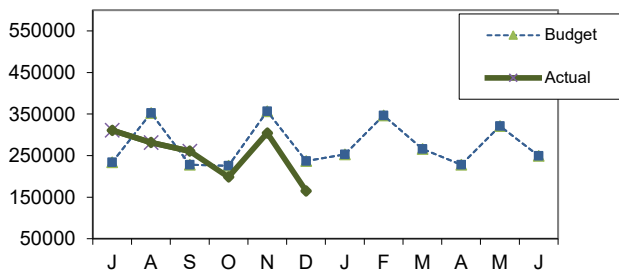


Average quarterly-sick leave for the 2nd Quarter of FY22 has increased compared to the 2nd Quarter of FY21 (2.948 from 1.725)

	Number of Employees	YTD (usage to date)	Annualized Total	Annual FMLA %	FY21
Admin	137	3.29	13.16	8.5%	5.87
Aff. Action	7	3.72	14.86	51.7%	3.14
Executive	4	1.97	7.89	0.0%	3.60
Finance	32	3.15	12.60	0.0%	3.17
Int. Audit	5	0.51	2.04	0.0%	0.89
Law	11	6.17	24.68	13.1%	5.83
OEP	4	4.91	19.63	0.0%	1.33
Operations	887	5.37	21.49	21.2%	7.95
Tunnel Red	10	2.28	9.10	29.0%	1.62
Pub. Affs.	11	4.03	16.11	40.4%	1.13
MWRA Avg	1108	1.66	9.93	20.6%	7.32

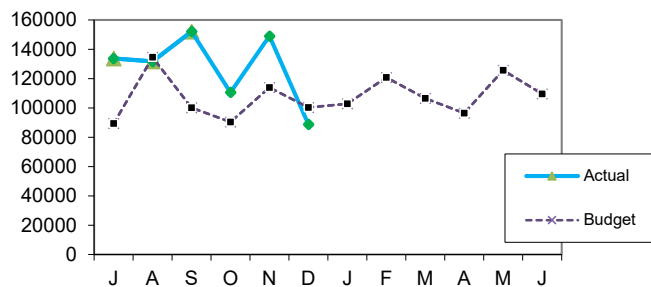
Percent of sick leave usage for FY22, attributable to Family and Medical Leave Act (FMLA) is 20.6%.

Field Operations Monthly Overtime \$



Total Overtime for Field Operations for the second quarter of FY22 was \$668K which is \$146K under budget. Emergency overtime was \$271K, which is \$158K under budget. Rain events were \$208k and Emergency Maintenance was \$37K. Coverage overtime was \$201K, which is \$54K over budget, reflecting the month's shift coverage requirements. Planned overtime was \$196K or \$41K under budget with combined spending of \$59K for Maintenance, \$43K for Planned Ops including \$21K for Holiday Overtime Straight Time (OTST), and \$44K for Half-Plant Operations.

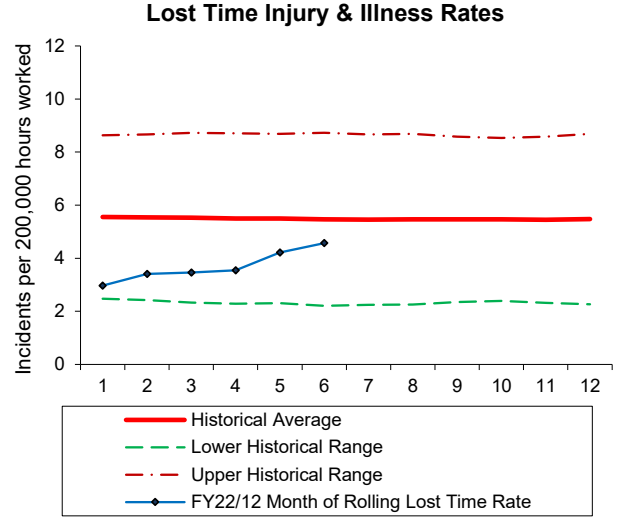
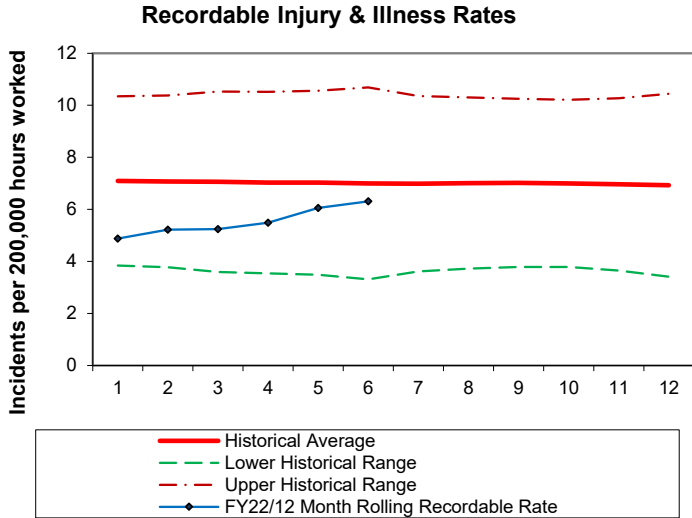
Deer Island Treatment Plant Monthly Overtime \$



Deer Island's total overtime expenditure during the second quarter of FY22 was \$348K, which was \$44K or 14.3% over budget. During the second quarter of FY22 Deer Island experienced higher than anticipated shift coverage of \$74K. This is offset by lower than anticipated storm coverage of \$20K and planned/unplanned overtime of \$10K. YTD Deer Island's overtime spending is \$766K, which is \$137K or 21.8% over budget due to higher than anticipated shift coverage of \$132K and storm coverage of \$55K. This is offset by lower than anticipated planned/unplanned overtime of \$50K.

Workplace Safety

2nd Quarter - FY22



- 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 FY22. 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	9	11	63
Medical Only	21	26	32
Report Only	13	13	
	QYTD		FYTD
Regular Duty Returns	9		14
Light Duty Returns	0		0
Indemnity payments as of December 2021 included in open claims listed			22

COMMENTS:

Regular Duty Returns

Oct 3 Employees returned to full duty/no restrictions
November 2 Employees returned to full duty/no restrictions
December 4 Employees returned to full duty/no restrictions

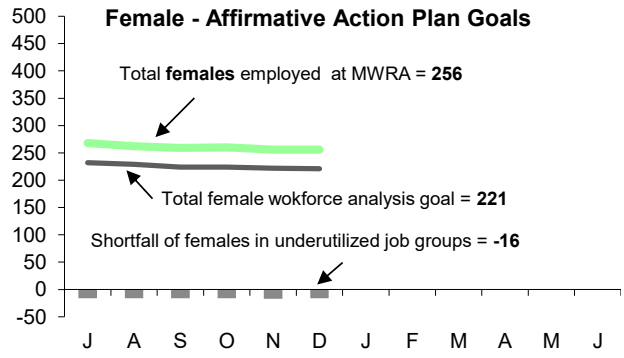
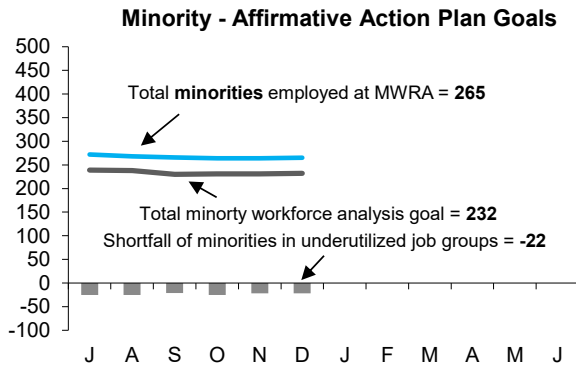
Light Duty Returns

Oct N/A
Nov N/A
December 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 - FY22



Highlights:

At the end of Q2 FY22, 5 job groups or a total of 22 positions are underutilized by minorities as compared to 6 job groups for a total of 26 positions at the end of Q2 FY21; for females 5 job groups or a total of 16 positions are underutilized by females as compared to 6 job groups or a total of 17 positions at the end of Q2 FY21. During Q2, 2 minorities and 2 female were hired. During this same period 0 minorities and 1 female were terminated.

Underutilized Job Groups - Workforce Representation

Job Group	Employees as of 12/31/2021	Minorities as of 12/31/2021	Achievement Level	Minority Over or Under Underutilized	Females As of 12/31/2021	Achievement Level	Female Over or Under Underutilized
Administrator A	24	3	1	2	12	6	6
Administrator B	25	2	8	-6	8	5	3
Clerical A	21	7	4	3	19	16	3
Clerical B	23	8	6	2	3	7	-4
Engineer A	80	23	18	5	19	19	0
Engineer B	61	20	17	3	14	9	5
Craft A	111	17	21	-4	0	4	-4
Craft B	133	21	18	3	2	3	-1
Laborer	68	21	16	5	5	3	2
Management A	92	22	28	-6	34	19	15
Management B	40	11	8	3	7	9	-2
Operator A	59	4	8	-4	2	2	0
Operator B	70	21	9	12	3	2	1
Professional A	30	5	7	-2	18	14	4
Professional B	165	49	39	10	80	70	10
Para Professional	47	15	10	5	23	21	2
Technical A	54	14	13	1	6	11	-5
Technical B	5	2	1	1	1	1	0
Total	1108	265	232	55/-22	256	221	51/-16

AACU Candidate Referrals for Underutilized Positions

Job Group	Title	# of Vac	Requisition Int./Ext.	Promotions/Transfers	AACU Ref. External	Position Status
Administrative B	Dir, Metropolitan Operations	1	Int./Ext.	1	0	Promo = WM
Craft A	M & O Specialist	2	Int./Ext.	2	0	Promo = 1WM, 1BM
Craft A	Unit Supervisor	1	Int.	1	0	Promo = WM
Craft A	Trades Foreman	2	Int.	2	0	Promo = 1WM, 1AM
Craft B	Third Class Engineer	2	Ext.	0	0	NH = 2WM
Craft B	Instrumentation Specialist	1	Int./Ext.	1	0	Promo = WM
Craft B	Med Volt Electrical Speciali	1	Int./Ext.	1	0	Promo = WM
Craft B	Facilities Specialist	1	Int./Ext.	1	0	Promo = WM
Craft B	Heavy Equipment Operator	1	Int./Ext.	1	0	Promo = WM
Craft B	Construction Pipelayer	1	Int./Ext.	1	0	Promo = TM
Management A	Sr Program Manager	1	Int./Ext.	1	0	Promo = WM
Management A	Business Applications Manager	1	Int./Ext.	1	0	Promo = WM
Management A	MBE/WBE Program Manager	1	Int.	1	1	Promo = BM
Management B	Proj Mgr, Hrbr & Outfl Monit	1	Int./Ext.	1	1	Promo = WM
Operators A	Area Supervisor	2	Ext.	2	0	NH = 2WM
Professional A	Asst Mgr, WC & Labor Relations	1	Int./Ext.	1	0	NH = WF
Professional A	Technical Operations Manager	1	Int./Ext.	1	1	NH = HM
Technical A	Tele-Inspection Foreman	1	Int.	1	0	Promo = WM

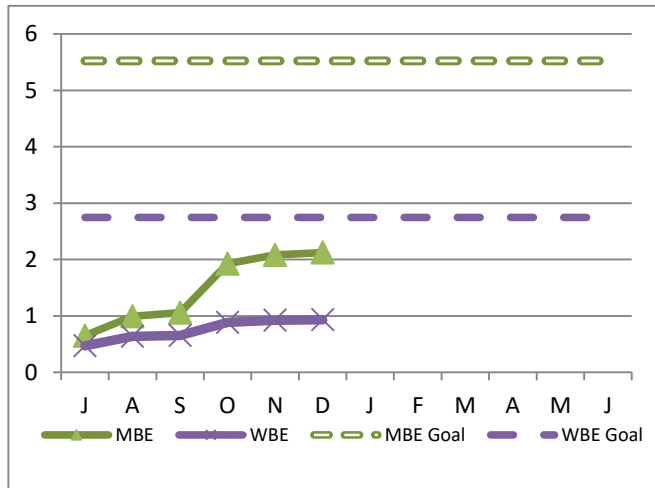
MBE/WBE Expenditures

2nd Quarter - FY22

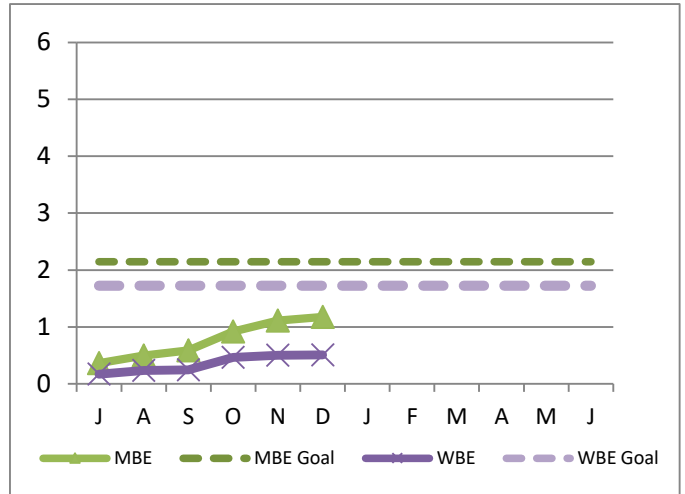
MBE/WBE targets are determined based on annual MWRA expenditure forecasts in the procurement categories noted below. The goals for FY22 are based on 85% of the total construction and 75% of the total professional projected spending for the year. Certain projects have been excluded from the goals as they 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.

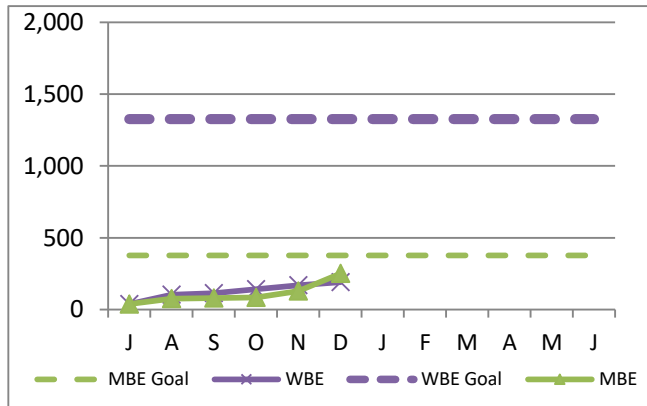
Construction



Professional Services



Goods/Services



FY22 spending and percentage of goals achieved, as well as FY21 performance are as follows:

MBE					WBE			
FY22 YTD		FY21			FY22 YTD		FY21	
Amount	Percent	Amount	Percent		Amount	Percent	Amount	Percent
2,122,411	38.4%	4,234,355	51.6%	Construction	931,448	33.9%	3,238,772	79.3%
1,175,228	54.8%	2,439,855	107.0%	Prof Svcs	508,264	29.5%	554,298	30.3%
250,433	66.4%	403,728	113.2%	Goods/Svcs	190,810	14.4%	528,645	40.9%
3,548,072	44.1%	7,077,938	65.3%	Totals	1,630,522	28.1%	4,321,715	60.0%

FY22 MBE/WBE dollar totals do not include MBE and WBE payments to prime contractors and consultants.

MWRA FY22 CEB Expenses through 2nd Quarter – FY22

As of December 2021, total expenses are \$364.9 million, \$11.5 million or 3.1% lower than budget, and total revenue is \$408.9 million, \$1.2 million or 0.3% over budget, for a net variance of \$12.8 million.

Expenses –

Direct Expenses are \$113.4 million, \$11.5 million or 9.2% under budget.

- **Wages & Salaries** are \$6.7 million under budget or 12.3%. Regular pay is \$6.7 million under budget, due primarily to lower head count, and timing of backfilling positions. YTD through December, the average Full Time Equivalent (FTE) positions was 1,119, forty-eight fewer than the 1,167 FTE's budgeted.
- **Ongoing Maintenance** expenses are \$2.9 million under budget or 17.6%, primarily due to the timing of projects.
- **Fringe Benefits** expenses are \$770k under budget or 6.8%, primarily due lower health insurance expense, reflecting the lower headcount.
- **Professional Services** expenses are \$691k under budget or 15.5%, primarily due to under spending for Computer System Consultant of \$581k, Engineering \$207k, and Legal expense of \$111k. Underspending was partially offset by higher spending on Security and Other Services which were over budget by \$126k and \$104k, respectively.
- **Workers Compensation** expenses are \$548k under budget or 41.9%, primarily due to under spending for Compensation Payments of \$313k and Medical Payments of \$190k. Due to uncertainties of when spending will happen, the budget is spread evenly throughout the year.
- **Chemicals** expenses are \$350k under budget or 5.3%, primarily due to under spending for Hydrogen Peroxide of \$306k based on usage as excessive rainfall helped lower H2S levels at Deer Island, Polymer of \$96k due to less usage for centrifuge operations, and Soda Ash of \$63k driven by Water Operations due to lower average flows at CWTP. These are partially offset by higher spending for Sodium Hypochlorite \$98k and Sodium Bisulfite of \$72k due to higher wastewater flows.
- **Utilities** expenses are \$1.0 million over budget or 8.5%, primarily due over spending for Electricity of \$1.4 million due to higher flows at Deer Island which accounted for \$773k of the electricity variance. Field Operations accounted for overspending of \$593k in electricity spending. Deer Island purchased 6.7% more kWh than planned as plant flows were 28.9% over budget due to wet weather events. Higher electricity prices also contributed to the spending variance. Lower spending for diesel, \$224k under budget, driven by DITP due to timing of deliveries.

Indirect Expenses are \$25.7 million, \$54k or 0.2% under budget. Lower Watershed Reimbursements of \$195k are partially offset by higher Insurance Claims of \$108k.

Capital Finance Expenses totaled \$225.8 million, matching budget after the transfer of \$6.3 million to the Defeasance account, driven by lower than budgeted variable interest expense and the impact of the refunding and new money transaction.

Revenue and Income –

Total Revenue and Income is \$408.9 million, or \$1.2 million over budget. Other Revenue was \$754k over budget, reflecting Miscellaneous Revenue of \$435k (includes Commonwealth reimbursement for BioBot expenses), gains on the disposal of equipment of \$518k, and Energy Rebates of \$197k, partially offset by lower Permit Fees of \$235k and lower energy revenues of \$162k. Other User Charges were \$487k over budget, reflecting unplanned water used by the Town of Burlington.

	Dec 2021 Year-to-Date			
	Period 6 YTD Budget	Period 6 YTD Actual	Period 6 YTD Variance	%
EXPENSES				
WAGES AND SALARIES	\$ 54,562,190	\$ 47,830,182	\$ (6,732,008)	-12.3%
OVERTIME	2,542,900	2,569,974	27,074	1.1%
FRINGE BENEFITS	11,406,088	10,635,664	(770,424)	-6.8%
WORKERS' COMPENSATION	1,307,079	758,806	(548,273)	-41.9%
CHEMICALS	6,578,477	6,228,439	(350,038)	-5.3%
ENERGY AND UTILITIES	12,293,609	13,336,483	1,042,874	8.5%
MAINTENANCE	16,302,724	13,440,086	(2,862,638)	-17.6%
TRAINING AND MEETINGS	255,417	141,679	(113,738)	-44.5%
PROFESSIONAL SERVICES	4,467,655	3,776,251	(691,404)	-15.5%
OTHER MATERIALS	2,235,865	1,961,052	(274,813)	-12.3%
OTHER SERVICES	12,962,008	12,743,947	(218,061)	-1.7%
TOTAL DIRECT EXPENSES	\$ 124,914,012	\$ 113,422,563	\$ (11,491,449)	-9.2%
INSURANCE	\$ 1,971,800	\$ 2,080,586	\$ 108,786	5.5%
WATERSHED/PILOT	7,519,222	7,323,760	(195,462)	-2.6%
HEEC PAYMENT	3,495,977	3,528,161	32,184	0.9%
MITIGATION	846,680	846,679	(1)	0.0%
ADDITIONS TO RESERVES	706,323	706,323	-	0.0%
RETIREMENT FUND	11,205,000	11,205,000	-	0.0%
POST EMPLOYEE BENEFITS	-	-	-	---
TOTAL INDIRECT EXPENSES	\$ 25,745,002	\$ 25,690,509	\$ (54,493)	-0.2%
STATE REVOLVING FUND	\$ 44,882,248	\$ 44,882,248	\$ -	0.0%
SENIOR DEBT	118,265,507	117,424,634	(840,873)	-0.7%
DEBT SERVICE ASSISTANCE	(1,287,870)	(1,287,870)	-	0.0%
CURRENT REVENUE/CAPITAL	-	-	-	---
SUBORDINATE MWRA DEBT	62,351,365	62,351,365	-	0.0%
LOCAL WATER PIPELINE CP	-	-	-	---
CAPITAL LEASE	1,608,530	1,608,530	-	0.0%
VARIABLE DEBT	-	(5,410,531)	(5,410,531)	---
DEFEASANCE ACCOUNT	-	6,251,404	6,251,404	---
DEBT PREPAYMENT	-	-	-	---
TOTAL CAPITAL FINANCE EXPENSE	\$ 225,819,779	\$ 225,819,779	\$ -	0.0%
TOTAL EXPENSES	\$ 376,478,793	\$ 364,932,851	\$ (11,545,942)	-3.1%
REVENUE & INCOME				
RATE REVENUE	\$ 396,042,000	\$ 396,042,000	\$ -	0.0%
OTHER USER CHARGES	4,360,428	4,847,730	487,302	11.2%
OTHER REVENUE	4,717,671	5,471,416	753,745	16.0%
RATE STABILIZATION	625,000	625,000	-	0.0%
INVESTMENT INCOME	1,964,418	1,955,252	(9,166)	-0.5%
TOTAL REVENUE & INCOME	\$ 407,709,517	\$ 408,941,398	\$ 1,231,882	0.3%

Cost of Debt 2nd Quarter – FY22

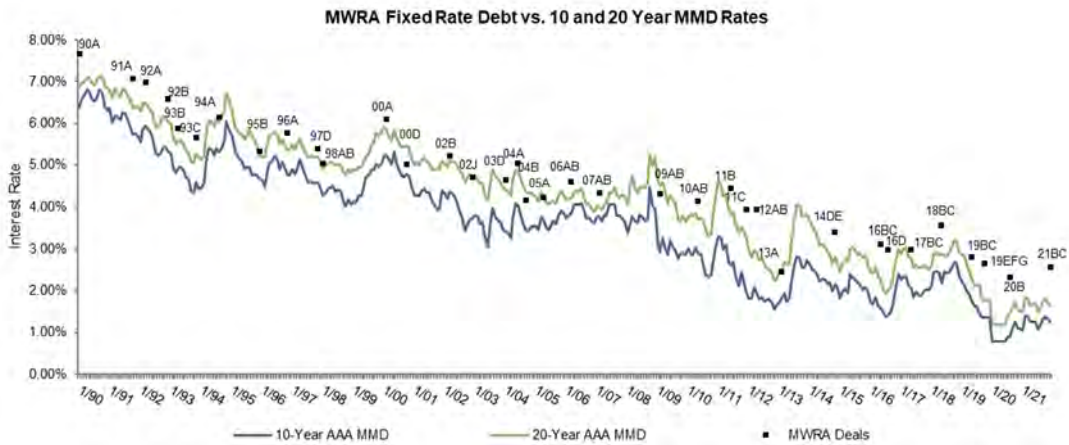
MWRA borrowing costs are a function of the fixed and variable tax exempt interest rate environment, the level of MWRA's variable interest rate exposure and the perceived creditworthiness of MWRA. Each of these factors has contributed to decreased MWRA borrowing costs since 1990.

Average Cost of MWRA Debt FYTD

Fixed Debt (\$3.41 billion)	3.22%
Variable Debt (\$299.1million)	0.46%
SRF Debt (\$832.3 million)	1.64%
Weighted Average Debt Cost (\$4.54 billion)	2.79%

Most Recent Senior Fixed Debt Issue December 2021

2021 Series B and C (\$748.0 million) 2.56%

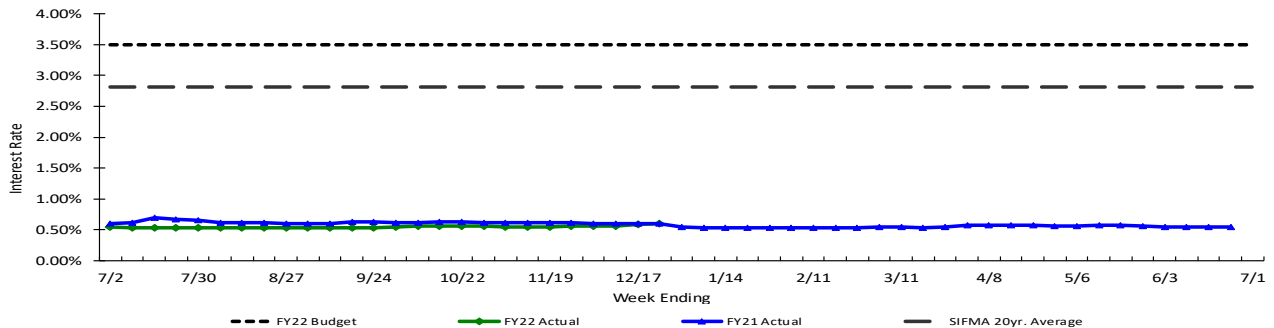


Bond Deal	1996A	1997D	1998AB	2000A	2000D	2002B	2002J	2003D	2004A	2004B	2005A	2006AB	2007AB	2009AB
Rate	5.78%	5.40%	5.04%	6.11%	5.03%	5.23%	4.71%	4.64%	5.05%	4.17%	4.22%	4.61%	4.34%	4.32%
Avg Life	19.5 yrs	21.6 yrs	24.4 yrs	26.3 yrs	9.8 yrs	19.9 yrs	19.6 yrs	18.4 yrs	19.6 yrs	13.5 yrs	18.4 yrs	25.9 yrs	24.4 yrs	15.4 yrs

Bond Deal	2010AB	2011B	2011C	2012AB	2013A	2014D-F	2016BC	2016D	2017BC	2018BC	2019BC	2019EFG	2020B	2021BC
Rate	4.14%	4.45%	3.95%	3.93%	2.45%	3.41%	3.12%	2.99%	2.98%	3.56%	2.82%	2.66%	2.33%	2.56%
Avg Life	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.	15.6 yrs	12.2 yrs

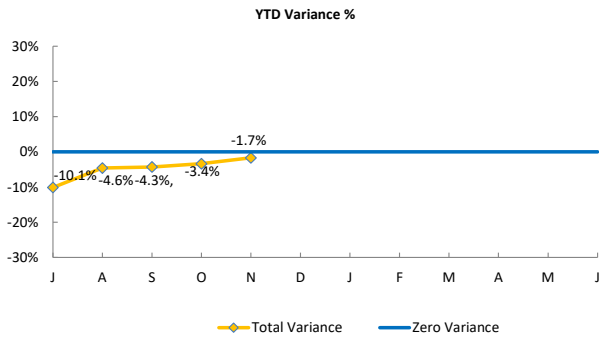
Weekly Average Variable Interest Rates vs. Budget

MWRA currently has nine variable rate debt issues with \$540.7 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, the SIFMA rate ranged from a high of 0.11% to a low of 0.05% for the month. MWRA's issuance of variable rate debt, although consistently less expensive in recent years, results in exposure to additional interest rate risk as compared to fixed rate debt.



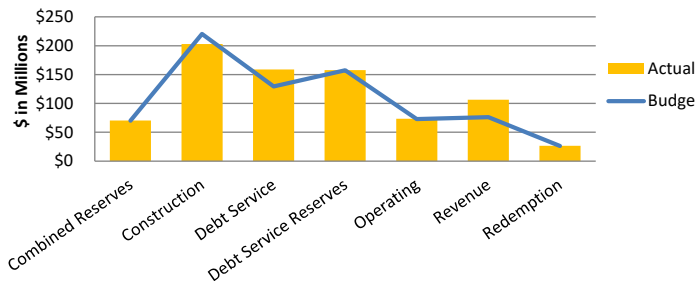
Investment Income 2nd Quarter – FY22

Year To Date

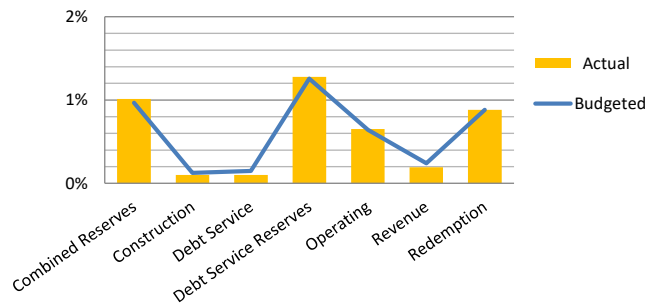


	(\$000)				
	BALANCES IMPACT	RATES	IMPACT	TOTAL	%
Combined Reserves	(\$0)		\$16	15	4.6%
Construction	(\$9)		(\$26)	(35)	-26.3%
Debt Service	\$22		(\$38)	(16)	-16.9%
Debt Service Reserves	\$3		\$16	18	1.9%
Operating	\$2		\$4	6	2.8%
Revenue	\$26		(\$24)	3	2.7%
Redemption	(\$0)		(\$0)	(0)	-0.4%
Total Variance	\$43		(\$52)	(\$9)	-0.5%

YTD Average Balances Budgeted vs. Actual

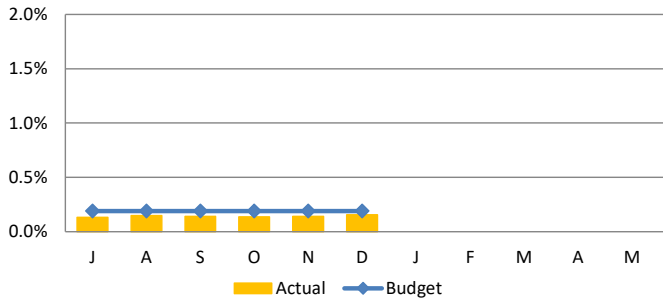


YTD Average Interest Rate Budgeted vs. Actual

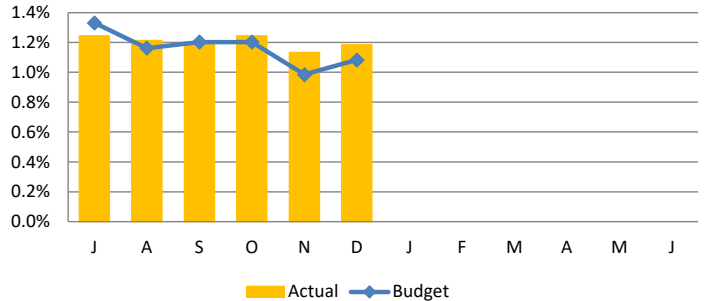


Monthly

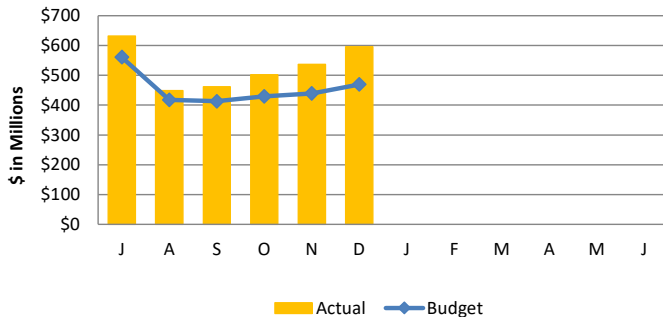
Short -Term Interest Rates



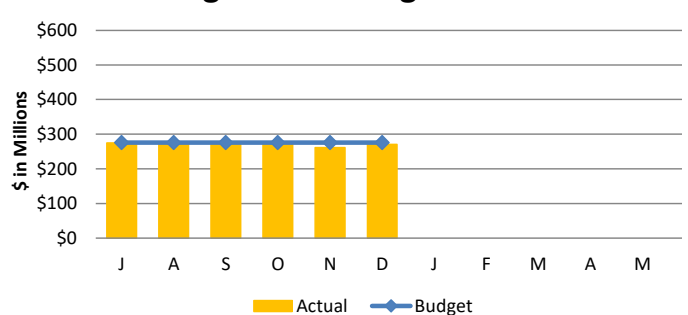
Long -Term Interest Rates



Short-Term Average Balances

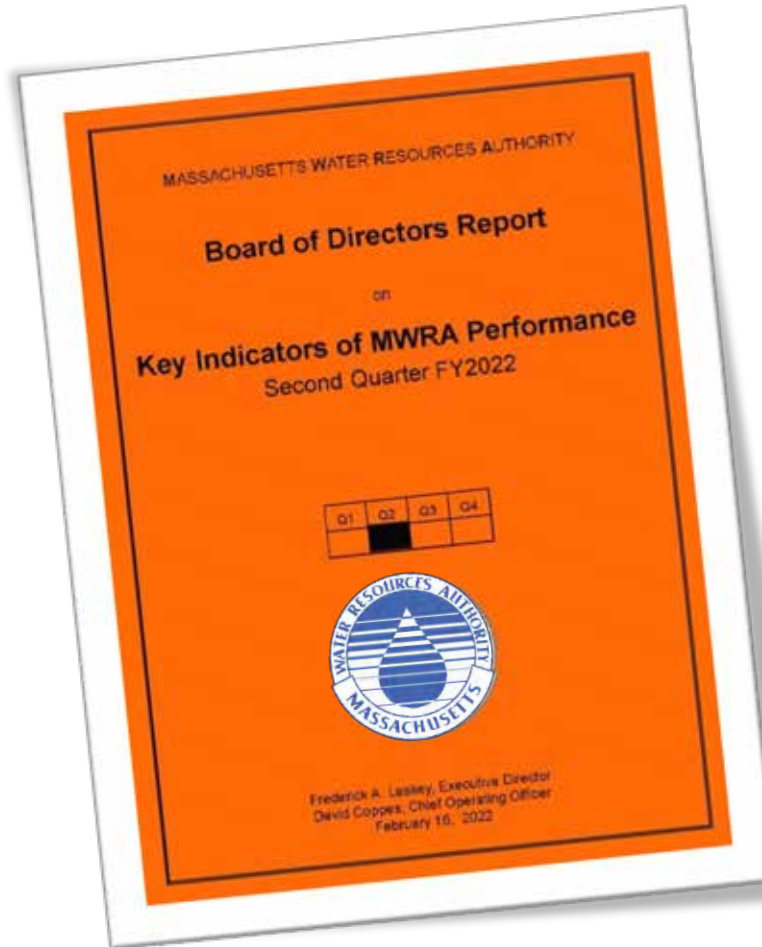


Long-Term Average Balances





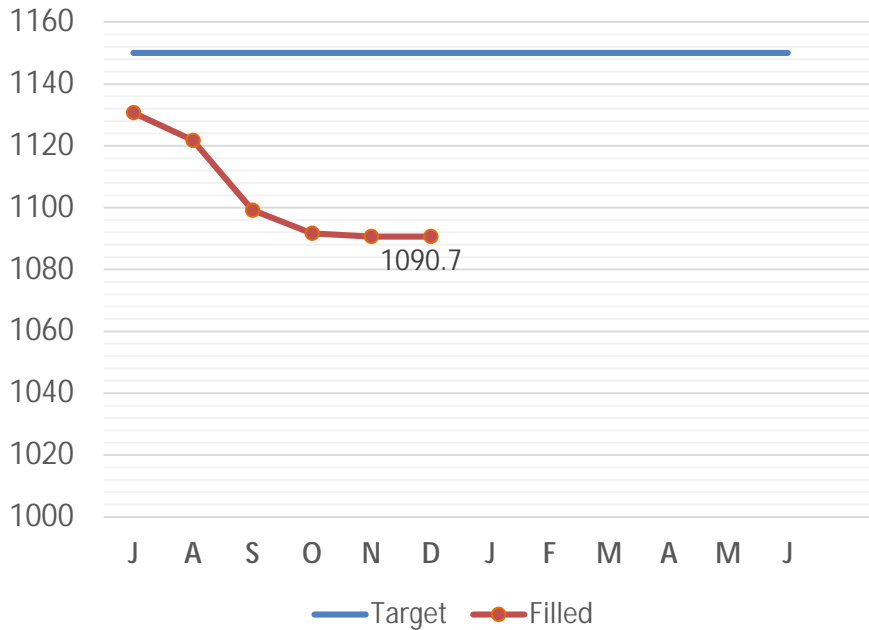
Massachusetts Water Resources Authority





Staffing

FTE TRACKING



FY22 Target for FTEs = 1150

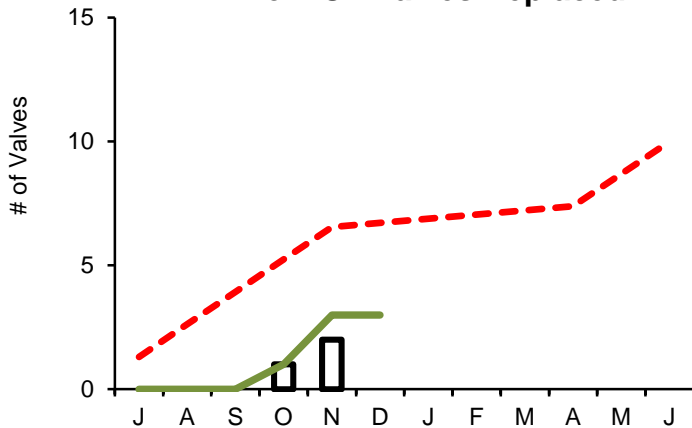
FTEs as of December 2021 = 1,090.7

Tunnel Redundancy as of December 2021 = 10



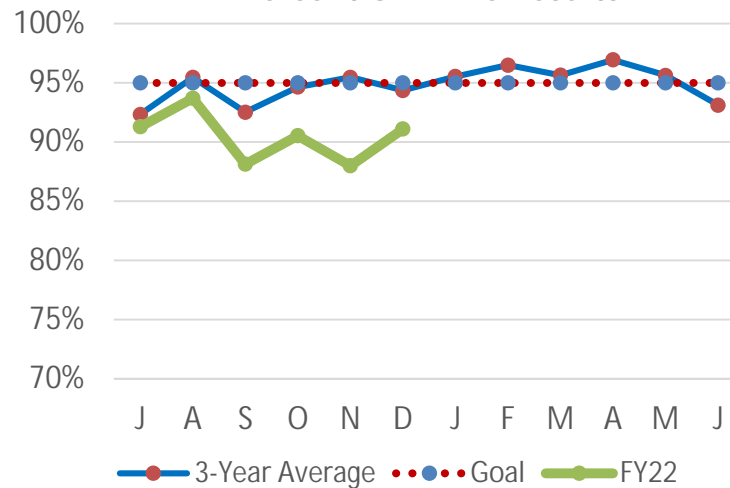
Staffing Impacts

Blow-Off Valves Replaced



Q2-FY22 there were three blow off valves replaced. The total replaced for the fiscal year to date is three. Below target due to isolation and permit issues and staff vacancies.

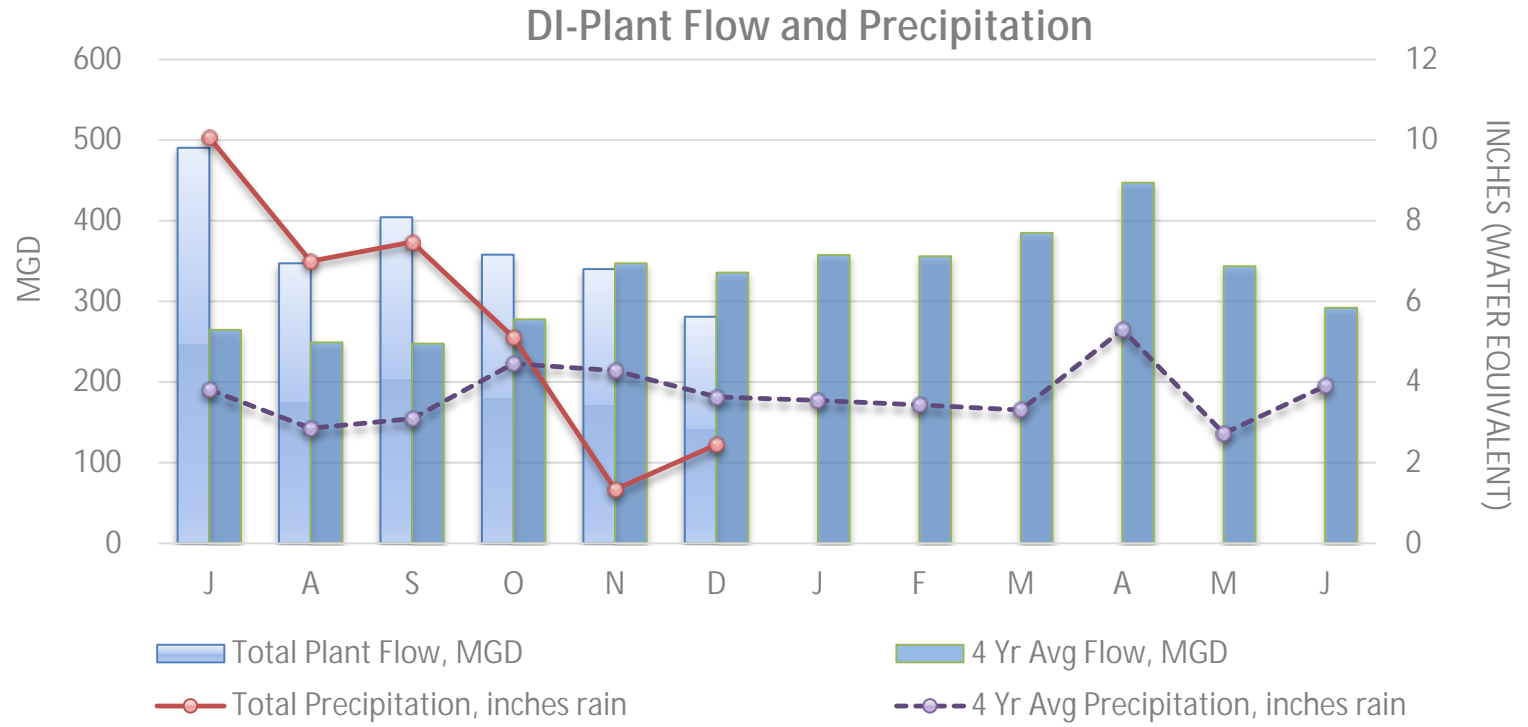
Percent On-Time Results



The Percent On-Time measurement fell below the 95% goal due to staffing vacancies



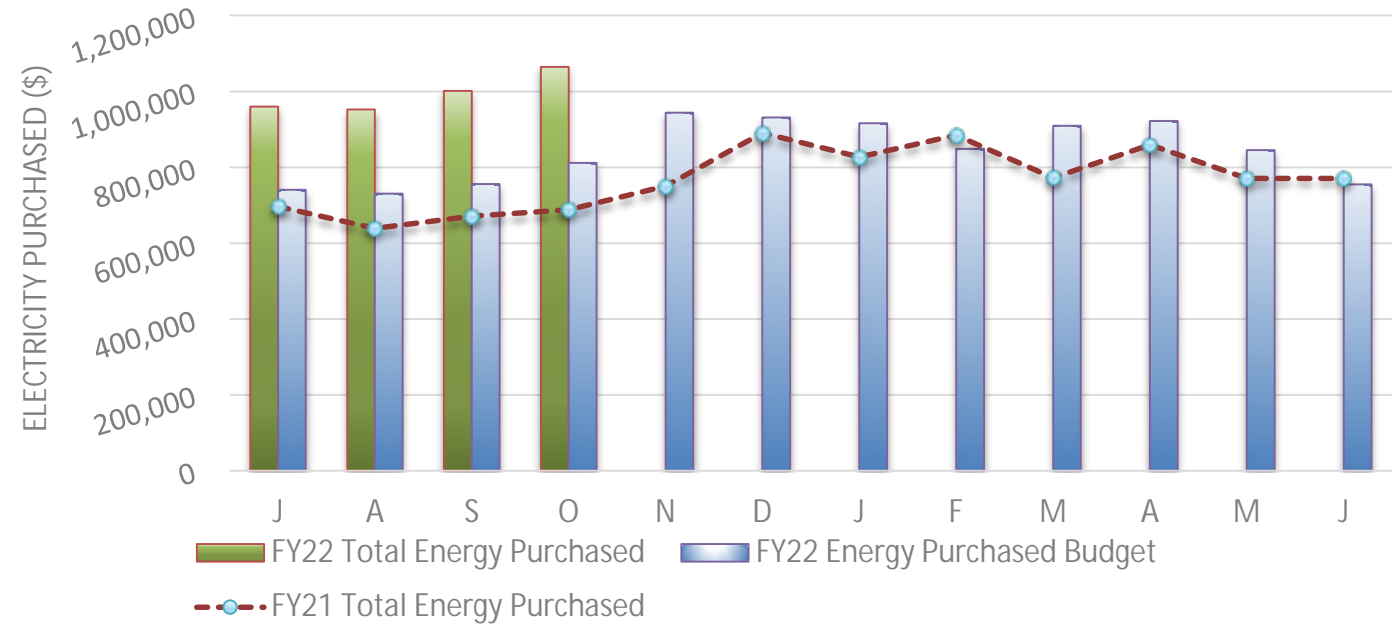
Deer Island Flows





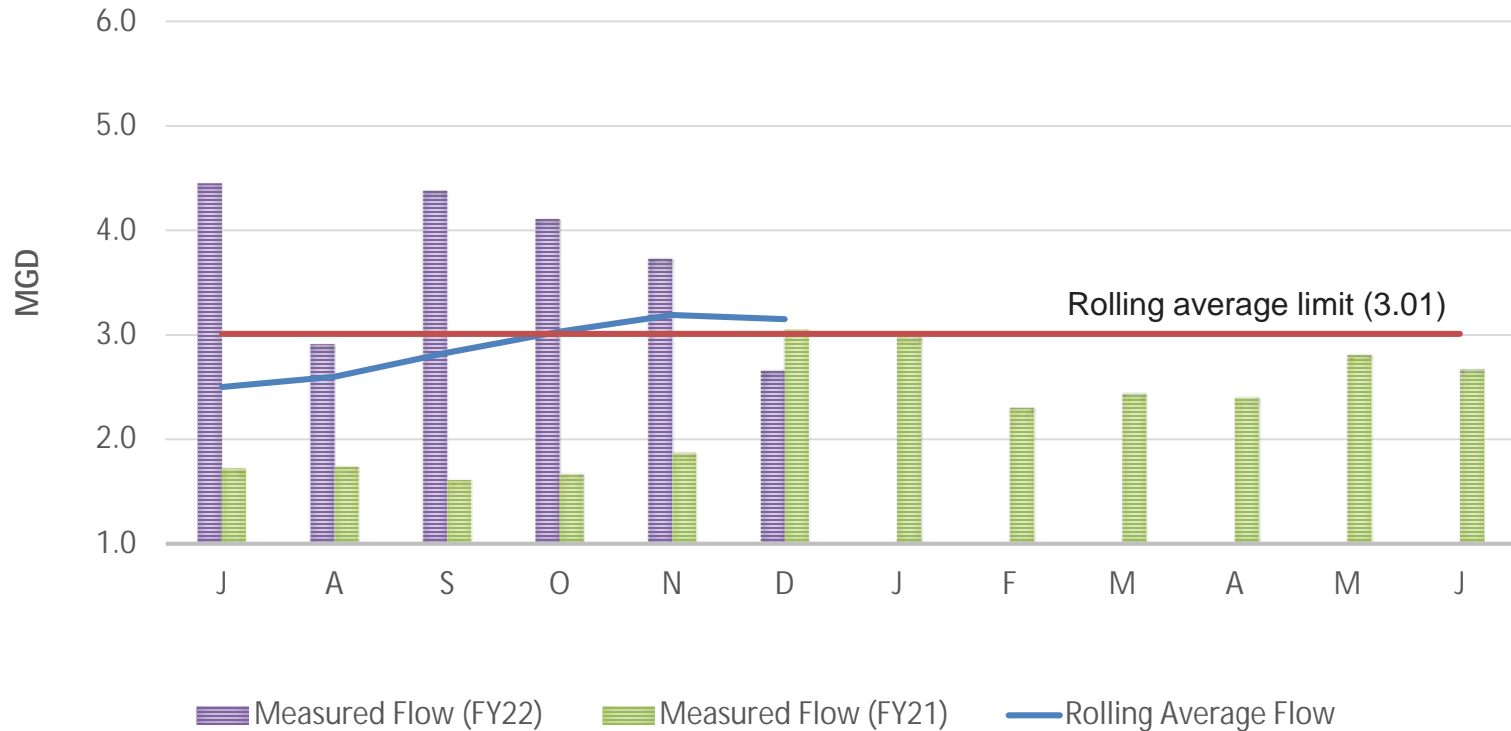
Energy Costs - Deer Island

Total Cost of Electricity



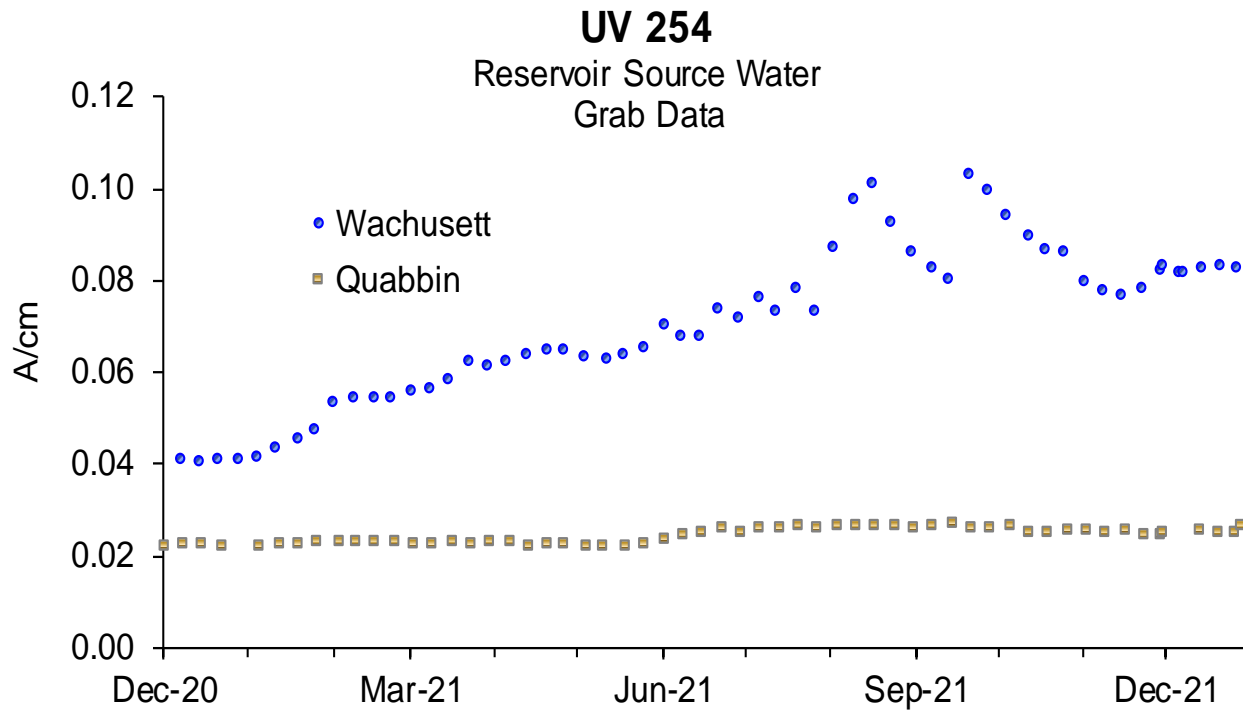


Clinton Wastewater Treatment Plant Flow





Reservoir Water Quality





Distribution System Water Quality

Chlorine Residuals in Fully Served Communities

	2020	2021											
	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
% <0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.3	0.7	0.9	0.5	0.4
% <0.2	0.4	0.2	0.1	0.0	0.0	0.0	0.2	0.7	1.3	2.8	3.1	1.7	0.8
% <0.5	2.5	1.9	0.8	0.2	0.3	0.2	0.6	2.6	6.0	12.3	10.9	7.4	2.8
% <1.0	5.3	3.6	2.5	1.5	2.0	1.0	2.1	8.6	17.3	27.9	26.2	15.7	7.3
% ≥1.0	94.7	96.5	97.6	98.5	98.0	99.0	97.9	91.4	82.7	72.1	73.8	84.4	92.7

Monthly Total Coliform Positives

