

October 19, 2010

Stephen Perkins, Director  
Office of Ecosystems Protection  
U.S. Environmental Protection Agency  
Water Enforcement  
OES4-SMR  
5 Post Office Square, Suite 100  
Boston, MA 02109-3912

Ms. Ann Lowery, Acting Assistant Commissioner  
Department of Environmental Protection  
1 Winter Street  
Boston, MA 02108

RE: Massachusetts Water Resources Authority  
Permit Number MA 0103284  
O&M Annual Report

Dear Mr. Perkins and Ms. Lowery:

Attached please find the MWRA's annual status sheets on plant performance and maintenance for the period covering July 2009 – June 2010. This submittal fulfills the requirements of MWRA's NPDES Permit MA0103284 - Section I.18.f and I.18.g that states in part:

“The MWRA shall submit annual status sheets on plant performance, using key indicators for maintenance ”

The Status Sheets will be posted at [www.mwra.com/harbor/pdf/omstatus.pdf](http://www.mwra.com/harbor/pdf/omstatus.pdf).

If you have questions or need additional information, please feel free to call Grace Bigornia-Vitale at 788-4942.

Sincerely,

Michael J. Hornbrook  
Chief Operating Officer

cc: MA DEP, Wilmington  
MA DEP, Worcester  
B. Pitt, US EPA  
T. Borci, US EPA  
D. Ferris, MA DEP  
C. Vakalopoulos, MA DEP  
F. Laskey, MWRA

# **MWRA Annual Report on Operation & Maintenance**

July 2009 – June 2010

This report has been generated to fulfill the requirements of MWRA's NPDES Permit MA0103284 - Section I.18.f that states:

"Within ninety (90) days of the effective date of this permit, the permittee shall develop and implement a long-range operations and maintenance plan that will maximize the life of the treatment facility. The permittee shall report on the plan's implementation and results to EPA and the MADEP on a yearly basis"

Also included with this submittal are the annual status sheets on plant performance, and maintenance as required in section I.18.g.

## **1. SYSTEM OVERVIEW**

### **Deer Island Sewage Treatment Plant**

The Deer Island Sewage Treatment Plant (DITP) is the centerpiece of MWRA's \$3.5 billion program to protect Boston Harbor against pollution from Metropolitan Boston's sewer systems. The DITP's purpose is to remove human, household, business, and industrial pollutants from the wastewater that is collected and transported through 5,400 miles of pipes and community owned sewer lines and approximately 228 miles of Authority owned interceptors and tunnels.

DITP is a state of the art wastewater treatment facility and one of the most automated in the country. The MWRA has made a considerable capital investment in the DITP and is fully committed to ensuring that this valuable public asset is cared for in the best possible manner. The MWRA's Board of Directors, Executive Director, management team, and staff are dedicated to providing the highest quality of asset management. The MWRA has assembled a highly skilled and qualified staff that will ensure that the treatment plant is operated and maintained to the satisfaction of the regulatory agencies and the public.

### **Wastewater Transport System**

The Field Operations Department (FOD) operates and maintains MWRA's wastewater transport system, which transports wastewater from MWRA member communities to the Deer Island Treatment Plant. This system includes a network of 228 miles of interceptor sewer lines, and related appurtenances; a screen house; 12 pumping stations; 4 headworks facilities; and 4 combined sewer overflow (CSO) facilities. The primary goal is to operate the system in a manner that will provide uninterrupted wastewater transport service in a safe, cost-effective, and environmentally sound manner.

## Fore River Pelletizing Plant

The operation and output of the Fore River Pelletizing Plant (FRPP) is regulated, in part, by the terms of a newly issued federal NPDES permit, 40 CFR 503 regulations, and state sludge regulations in Massachusetts (310 CMR 32.00) and the states to which the pelletized product is shipped. Other important external factors that influence operation of the FRPP include an extensive residuals management facilities plan developed as part of the permitting process for the FRPP as well as commitments to local communities.

Under the terms of the current operating agreement between New England Fertilizer Company (NEFCo) and MWRA, NEFCo budgets for, and performs all necessary predictive, preventive and routine maintenance at the FRPP. NEFCo's agreement contains a plan for the maintenance, repair and operation of the facility. At this time, it appears that NEFCo performance meets the necessary standard for proper operation and maintenance. Since the inception of the agreement in March of 2001, there has not been an incident requiring an interruption in service.

The operating agreement requires NEFCo to provide a letter of credit in the amount of \$1,000,000 (adjusted for inflation) that MWRA may draw on in the event that there is a material breach of the operating agreement, such as failing to adequately maintain the facility.

## **2. PERMIT VIOLATIONS**

There were no violations at MWRA facilities due to inadequate maintenance efforts.

## **3. COMPUTERIZED MAINTENANCE MANAGEMENT SOFTWARE**

The maintenance management software used by the Authority is MAXIMO version 5.2. The software includes safety plan and job plan features that allow users to document hazardous materials and areas around the plant. It has the ability to automate lockout/tag-out procedures or tasks and generate associated work orders for the field. MAXIMO provides document management capabilities to streamline maintenance and regulatory functions, and workflow capabilities for synchronizing operations. Applications can be fine-tuned to suit specific work processes or integrate with other programs. The software also includes mobile applications for gathering and downloading data and an intuitive interface.

Maintenance staff can prioritize tasks, assign work based on the availability of necessary parts and labor, and analyze equipment failures in order to implement appropriate preventive maintenance measures.

The MAXIMO maintenance management tool is used to manage the DITP maintenance program and has been implemented for all Wastewater Facilities. The software is used for work order management, planning and scheduling, asset management, resource management, recording of maintenance costs, and generation of reports and analyses. The software can store large amounts of data and is equipped with built-in failure analysis programs. In addition, MAXIMO contains the historical record for all maintenance activities, thus allowing staff to better address a problem with a facility, or a specific asset group.

The MAXIMO system was upgraded in February 2007 to an intranet version (Maximo 5.2) for both Deer Island and Field Operations Division. The upgrade allows continued customer support and takes advantage of web-based software maintenance. This version reduces the labor hours for MIS staff to maintain the software as all testing and programming are completed remotely and not at each desktop computer.

MWRA has implemented a new module within Maximo called Transportation. This module focuses on fleet services which includes all MWRA plated vehicles. Software is customized specifically to track, document and report information about all Transportation vehicles and equipment.

NEFCO has installed and populated a computerized maintenance management software - Quickmaint. Quickmaint is used for work order management including preventive and corrective maintenance work.

#### **4. FACILITIES ASSET MANAGEMENT PROGRAM (FAMP)**

The goals of the MWRA multi-year maintenance plan include coordinated, consistent asset inventory; condition assessment; maintenance scheduling and long-term replacement planning. The MWRA is developing, and implementing, this multi-year plan, in part, under an initiative entitled the “Facilities Asset Management Program.” This asset management program addresses the goal of becoming more efficient by developing consistent, compatible and cost-effective operations and maintenance procedures.

Since the start-up of new Authority facilities, the MWRA has been conducting its maintenance on a calendar schedule in accordance with the original equipment manufacturers’ (OEM) recommendations. This approach to maintenance was primarily driven by the contractual obligations of the OEM warranties. The Authority’s management team believed that it was important to modify its existing program with the goal of achieving a more holistic approach to maintenance management. MWRA management acknowledges the importance of asset management and developed the Facilities Asset Management Program (FAMP) to meet the long-term demands of facility maintenance. The main objective of the FAMP program was to develop a sound maintenance strategy that would ultimately lead to better overall asset management and extended equipment life and reliability.

During Phase 2 of FAMP, the MWRA expanded its efforts in the areas of condition monitoring; Reliability Centered Maintenance rollout; asset replacement prioritization and capital improvements; and training of staff. DITP is currently in Phase 3 of FAMP.

**5. SERVICE CONTRACTS**

The maintenance program is supplemented by a series of service contracts. These contracts are intended to provide specialized services beyond the resources of the MWRA maintenance staff. Table 1 below shows the service contracts currently used by MWRA.

<b>TABLE 1</b>
<b>DEER ISLAND CURRENT SERVICE CONTRACTS</b>
Laser alignment
Boiler maintenance
CCTV maintenance
Centrifuge maintenance
Combustion Turbine Generator maintenance
Continuous emissions monitoring
Copier/fax maintenance
Crane maintenance
Cryogenics facility maintenance
Digester Mixer overhauls
Electrical testing
Elevator maintenance
Facilities coatings
HVAC chemical treatment
Hydro turbine generator maintenance
Hydraulic maintenance
Instrumentation maintenance
Janitorial services
Lab hood certification
Plant landscape services
Legion Ella testing
Locksmith services
Lube oil analysis
Oil separator cleaning
Overhead door maintenance
Pest control
Plant instrumentation and control system (PICs) maintenance
Pratt Whitney Preferred service
Public access grounds keeping
Reactor Mixer gearbox rebuild
Security
Steam turbine generator maintenance
Trash removal
Vibration analysis

## Deer Island Treatment Plant

July 2009 - June 2010

**Annual Report:** Attached, please find the Deer Island Maintenance pages of the MWRA Report on Key Indicators of Performance for FY10. Monthly maintenance data is shown under six headings.

- Preventive Maintenance Orders Completed is shown with respect to the target of 100% in a bar chart. Maintenance is working to reach the PM goal of 100%. The average PM % completed was 99.9% for the past four years.
- Preventive Maintenance Kitting - The first step to increase wrench time is to have all parts available for preventive maintenance work orders. Kitting is a task where the maintenance planner identifies the specific parts required for a task and the warehouse personnel assemble the parts in one location (kit) for the technician to pick up and use. Deer Island reached their goal of 100% of all preventive maintenance work orders. We will move from tracking just preventive maintenance kitting to tracking all work orders in FY11.
- Predictive Maintenance - To extend the useful life of equipment and plan for equipment replacements, predictive maintenance technologies are being implemented. 4187 work orders were completed for vibration, acoustic ultrasonic, ultrasonic thickness, and oil analysis in the past year. As the year progressed more predictive maintenance was planned. For the year, 17 % of all work orders were predictive maintenance. This is an increase of 2.0% from 2009.
- Maintenance Backlog in Crew Weeks - Backlog is determined by totaling the planned craft hours in open work orders and comparing them to craft resources available. The average backlog for last year was 7.6 weeks for day to day plant maintenance activities which is slightly over the industry standard of 4 to 6 weeks. DITP monitors all of our metrics very closely to ensure the backlog is not affecting our availability of equipment. We are making a change in the backlog metric to display information in hours.
- Maintenance Project Backlog in Crew Weeks – The average backlog for normal day to day maintenance activities and project backlog was 7.6 weeks which includes 1 week of project backlog.
- Maintenance Overtime - The goal to maintain maintenance overtime to 5% of total wages and salaries was accomplished this year. This doesn't include any wet weather event overtimes were maintenance staff is on site only as a precaution during a storm.

**Critical Equipment Availability:** 12-Month Average – 98.5 %

An equipment availability report is generated daily that details the critical equipment required to treat the design flow of approximately 1.2 billion gallons per day. Higher maintenance priority is given to equipment that drops below the number required. No operational impact has occurred in the past year from a 98.5 % verses a 100% availability because the plant normally operates at approximately one-third the design flow capacity.

This is a slight decrease from last year due to a CIP project (Clarifier Re-habilitation project) on going to repair chain and associated equipment inside our clarifiers.

**Day to Day Plant Maintenance Average Backlog was 7.6** Backlog is determined by totaling the planned craft hours in open work orders and comparing them to craft resources available. Day to day plant maintenance backlog includes all PM, PdM, Project and CM backlog. A 7.6-week backlog constitutes 7.6 weeks of work for the entire maintenance workforce. This backlog is slightly higher than the industry standards of 4 to 6 weeks. DITP monitors all of the metrics very closely to ensure the backlog is not affecting the availability of equipment.

**Preventive Maintenance (PM):**

99.9% of all PMs were completed and 21,060 PM work orders were initiated this year. Incomplete PM's that are not completed in one month are rolled over into the next month's workload and given a high priority to complete first.

**Predictive Maintenance (PdM)**

4187 predictive maintenance work orders were completed in the past year. Predictive maintenance work includes vibration, acoustic ultrasonic, ultrasonic thickness and oil analysis and is proactive maintenance work to extend equipment useful life.

**Average Craft Hours per Month:**

Preventative Maintenance	2892 hours	20.0 %
Predictive Maintenance	297 hours	2.0 %
Corrective Maintenance	8926 hours	61.5 %
Emergency Maintenance	24 hours	0.5 %
Project Work	1511 hours	10.0 %
Other Work	856 hours	6.0 %
<b>Total</b>	<b>14,506 hours</b>	<b>100.0 %</b>

**Total Work Orders:**

37,183 work orders initiated this year  
36,167 work orders completed/closed  
1995 work orders canceled

**Equipment Replacement:**

Major replacements, in the past year, include the following:

- Centrifuges Refurbishment - \$ 286,351

We currently have twelve waste sludge centrifuges which because of the high speed rotating assembly and critical nature of the process, require maintenance. The centrifuges require refurbishment at regular intervals based upon running hours for normal wear and tear. Due to the intricacy of the equipment all overhauls are sent back to Alfa Laval, the original equipment supplier. In the past year, two waste sludge centrifuges and gearbox were refurbished. Maintenance purchased spare parts for controllers and scheduled refresher training for the staff on the centrifuge system this year.



- Digester Mixers Refurbishments - \$156,446

Two digester mixers were refurbished based upon impeller and bearing wear identified through vibration testing. Two mixers were removed and shipped to the factory

- Coating Contract \$764,833

The Coating contract was awarded to SOEP Company. The areas completed in FY10 were various chemical sump areas, odor control piping and the exterior areas of Residuals.

- Reactor Aerator/Mixer Gearbox Rebuilds \$ 175,857

The secondary reactor aerators and mixers have large gearboxes that have started to fail. Seven gearboxes were refurbished in FY10 with new gears, seals, and bearings as necessary.

- Hydro Plant Repairs - \$24,905

A maintenance contract was put in place to perform annual preventive maintenance and repairs as necessary. This contract has been combined with STG for FY10.

- Cryogenic Facility Repairs - \$478,080

The cryogenic facilities have an annual maintenance contract to handle preventive maintenance and some project maintenance work. The project maintenance work includes two shut downs per year and scheduled projects. The scheduled project this year was the level D inspection for compressor 1B which was to repair the rotating assembly, shroud, and intercoolers.

- Roof Replacements - \$ 2,700,000

DITP has started a program to replace facility roofs over the next few years. The three facilities which were completed in FY10 were Vehicle Maintenance building, Winthrop Facility and the Cryogenic Facility. They were replaced due to normal wear and tear.

- Elevator Controllers \$125,000

We have replaced the existing elevator controller in Residual Module 3 which brings staff and materials to the digester mixer motor level. We replaced the existing controller with a new Galaxy controller. The Galaxy controller variable-frequency closed loop controller with phase 1-2 fire service and code compliant features. The existing controller was obsolete.

- Disinfection Basin Tip Tubes \$100,000

DITP has completed the installation of the East and West side of Disinfection. Maintenance developed and scheduled an in-house project to replace dip-tubes and drives in the disinfection basins. Machine shop fabricated tubes, bearings, and supports. DITP maintenance along with machine shop performed the installation.

- Norwalk Digester Gas compressor rebuilds \$150,000

The second and third Digester Gas Compressor was completed this year. All three compressors require some level of specialized maintenance and/or need for replacement parts, the age and maintenance history of this equipment implies that all of the operating compressors are scheduled for complete overhaul. The original equipment manufacturer has recommended a major inspection or overhaul at 8,000 run hours. Each of these compressors have an estimated of 24,000 run hours. This is three times the suggested time frame for an overhaul. The compressor (gas end) is considered to be of “non-standard” and “custom machined” designed specifically for the Deer Island gas-system application. Initial inspection work performed by Norwalk technicians identified several items requiring OEM servicing including, new pistons for the upper and lower halves of the compressors.

- Tip Tube project for Primaries \$95,000

The Tip Tube project was initiated to install new tubes, actuator and drive to capture scum as designed by in-house staff. DITP has started a pilot program on Primary B-11 and B-12. One unit is a gear drive and the other is belt driven. The units have completed their pilot program and have been deemed successful. We have bid out additional stainless steel material to install four new tip tubes in Primaries. We will be installing these units in the next calendar year. The long term plan is to turn over design to engineering to have a CIP contract to install new tip tube assembly throughout primaries.

- Lighting Demand Management 1,000,000

This is a multi year lighting improvement project with NSTAR aimed to reducing our electrical demand. The project includes replacing existing lamps and ballasts with high performance fluorescent reduced wattage fixtures, integrated day lighting and occupancy controls. It also replaces exit signs with LED technology. This project is in line with DITP energy initiative.

- Electrical Repairs - \$ 200,000

The electrical system on Deer Island is extremely important which requires constant maintenance and equipment replacements to ensure reliability. These steps are necessary throughout the electrical distribution system. Some of these repairs and changes are installing new various variable frequency drives, install new and rebuilt Gem drive units, install new communication/interface cards and install Uninterrupted Power Supply units (UPS).

## **Wastewater Transport System**

July 2009 - June 2010

### **Wastewater Transport System Overview**

The Field Operations Department (FOD) operates and maintains MWRA's wastewater transport system, which transports wastewater from MWRA member communities to the Deer Island Treatment Plant. This system includes a network of 228 miles of interceptor sewer lines and related appurtenances, a screen house, 13 pumping stations, four remote headworks facilities, and four combined sewer overflow (CSO) facilities. The Union Park CSO facility is operated under contract. The contract requires compliance with the facility NPDES permit and includes well defined maintenance tasks. The primary goal is to operate the system in a manner that will provide uninterrupted wastewater transport service in a safe, cost-effective, and environmentally sound manner.

### **Wastewater Transport Facilities**

#### **1. Facilities Operational Statement**

During FY10 Wastewater Transport facilities operated at full capacity throughout the year. All required equipment to maintain flow and process of wastewater was available. CSO facilities operated with sufficient chlorination and dechlorination, though some NPDES exceedances were reported. The required number of pumps in each gravity and pumping CSO was available throughout the year.

#### **2. Equipment Availability**

The critical equipment evaluated includes pumps and screens in the pump stations, CSOs, the screenhouse, and headworks. Operational staff track and report the availability of critical equipment on a daily basis and report on a weekly basis. The equipment availability for FY10 for FOD facilities was 99.9%. Higher maintenance priority is given to equipment that drops below the number required.

#### **3. SCADA Program**

The MWRA Supervisory Control and Data Acquisition (SCADA) systems provide a means of monitoring and controlling facilities and equipment from a remote centralized location, as well as providing a continuous record of facility operations.

The Wastewater SCADA Implementation program originated with the development of a Master Plan in July 1999. In June 2002, Contract 6532 was awarded to Camp Dresser & McKee, Inc., to provide design, integration, training, construction administration and resident inspection services for SCADA improvements at MWRA's wastewater facilities.

Phase I (Construction Package 1 - Contract 6533), the first and most complex construction contract, was awarded in March 2006 and was completed in 2008. This contract successfully upgraded equipment, installed instrumentation, and integrated seven pumping facilities, three CSO facilities, and the Chelsea Screen House into MWRA's SCADA system;

Phase II (Construction Package 2 - Contract 6534) was awarded in February 2008. This contract added instrumentation upgrades to the three older headworks facilities (Ward Street., Chelsea Creek, and Columbus Park) and the Nut Island headworks facility, to standardize and integrate these four facilities into the SCADA system. The contract also includes the upgrade of software, PLC and screen displays at the Squantum, Quincy and IPS facilities to make them consistent with the other wastewater facilities.

At the completion of Phase II, the only remaining wastewater transport facility to be upgraded in the SCADA system was the Arthur Street Pump Station. This work was completed during FY10 using a combination of in-house resources and consultant services.

#### **4. Equipment Replacement and Significant Maintenance Projects**

Equipment replacement is part of the overall maintenance strategy that ensures compliance with permit requirements. Projects and initiatives are completed during each fiscal year to maintain redundancy and continued reliability. Many projects are extensive, requiring significant in-house resources and use of specialty/service contractors. Some examples of key improvements, equipment replacement, or significant repair work during the past fiscal year include in-house and out-sourced projects:

##### ***In-house Projects***

Remote Headworks Improvements: Staff are working to replace equipment at the headworks to maintain equipment reliability. Each year, staff will work to upgrade the headworks equipment. In the past year the following replacements have been completed:

- 5 Grit Pods – 3 Chelsea Creek and 2 Columbus Park
- 6 Incline Screws – 2 Chelsea Creek, 2 Columbus Park, 2 Ward Street
- 8 Horizontal Screws – 4 Columbus Park and 4 Ward Street
- 1 Channel - Collector Chain, Shoes, Wear Strips at Columbus Park
- Grit Piping – 45 feet of grit piping was replaced at Ward Street

Cottage Farm CSO: Cottage Farm Washdown Pumps 1 and 2 experienced numerous bearing and seal failures. The piping, pumps and motors were removed, and a Mason demolished the existing bases and formed new ones. The equipment was reinstalled, laser-aligned, and the equipment was returned to service.

Braintree/Weymouth Pump Station: The 3 pumps in the station were removed one at a time and sent to the manufacturer's representative for inspection. The manufacturer's representative rebuilt each pump with a new wear ring, adjusted the clearance and replaced the mechanical seal. MWRA staff reinstalled each pump, tested it and turned it over to Operations.

Nut Island Screening Conveyor #2: The Carrying and Cover belts had worn and in need of replacement. The old belts were removed, conveyor housing was cleaned with old bearings/ rollers removed and replaced as needed. New carrying and cover belts were installed, vulcanized and returned to service.

Nut Island #3 and #4 Classifier Rebuild – The classifiers chutes and screws were in need of replacement/repair. MWRA Welder/Machinist repaired the chute using rolled stainless steal welding it to the existing chute. A new longer screw with an external lower bearing was installed. The modification should prolong the life of the screw and chute. Modifications to the remaining classifiers is planned to be completed in the next year.

Nut Island Headworks Waste Drains: The waste drains located on the vortex level were prone to clogging and numerous leaks. MWRA Plumbers removed the old drains and replaced the piping, cleanouts and flushing valves.

Framingham Chemical Feed System: The plumber and electricians completed the installation of the new chemical feed system. A new containment berm was installed by the masons.

Framingham Unit Heaters: The unit heaters in the wet well area were all replaced with new units.

Squantum Pump Station: A pump and grinder was replaced with new units by in house staff.

### ***Outsourced Projects***

Prison Point River Water Pipeline Rehabilitation: The river water line entering the facility was damaged and was repaired by an Insituform lining process. Prior to the repair excessive silt was entering the river water pump strainers that impacted operations.

Carbon Replacement: Carbon for the odor control carbon adsorbers at DeLauri, Hayes, Framingham, and one unit at Nut Island were replaced.

New Neponset Pump #3 Upgrades: The drive shaft and gear box for pump 3 at New Neponset were sent out for inspection and rebuild. Both pieces of equipment were returned from outside vendors and reinstalled by Equipment Maintenance Mechanics. The variable frequency drive was replaced by a vendor with a new model.

Braintree Weymouth Grinder: The two grinders were sent back to the manufacturer for design changes to improve performance under warranty.

## **Wastewater Transport Pipelines**

### **1. Manhole Inspection and Rehabilitation Program**

The Technical Inspections Unit (TIU), of the FOD conducts manhole inspections. These inspections facilitated the beginning of the manhole rehabilitation program. Specialized equipment and training are the essential elements of the program. Pipeline maintenance crews perform manhole renovations and repairs that result in reduced I/I. The manholes are coated using cementitious material applied with spinning equipment and then covered with special coatings to resist corrosion from hydrogen sulfide.

In FY10 TIU staff inspected a total of 682 manholes. Approximately 178 manholes were repaired or rehabilitated. This work included frame and cover replacement, external repairs to raised manholes, internal repairs using the spin-cast application, and other miscellaneous repair work.

### **2. Pipeline Rehabilitation**

Pipeline Rehabilitation projects are first identified by the TIU during routine television inspections of the pipelines and interceptors. MWRA Engineers review these projects and perform or coordinate all necessary design and construction contracting, beginning with conceptual design. The following represents a list of current and ongoing pipeline projects construction/rehabilitation included in the MWRA Capital Budget.

#### **East Boston Branch Sewer Rehabilitation, East Boston:**

Initial work consisted of repair of approximately 5400 feet of 45-inch x 41-inch brick sewer, using a cured-in-place, resin-impregnated, flexible felt tube liner. Construction began in April 2003 and substantial completion in May 2004. A final video inspection performed after one year revealed 900 linear feet of liner failure. Removal and replacement of the failed portions, performed under the contract warranty, was completed in 2005. The project cost is about \$5.4 million.

The design and construction phases for new sewers to replace existing, hydraulically-limiting sewers are complete. Construction of approximately 13,500 feet of relief sewers by microtunneling and 6,000 feet by pipebursting began in June 2008 and was completed in July 2010.

#### **Section 624 Braintree-Weymouth Interceptor**

Approximately 2,000 feet of Section 624, a 57-inch x 60-inch concrete sewer, requires rehabilitation due to continued corrosion from discharges containing hydrogen sulfide from the Hingham Pump Station. The design phase is complete. Construction began in June 2010 and will be completed in December 2010.

#### **Contract 7248 Section 50 to Section 51 Sewer Connection, Melrose**

Contract 7248 includes the construction of approximately 660 feet of new 18-inch PVC sewer, a new 18-inch gate valve, and removal and replacement of approximately 35 linear feet of 20-inch-diameter, cast-iron pipe with new 20-inch-diameter, ductile-iron pipe. The project is designed to eliminate SSOs at the Roosevelt Elementary School in

Melrose. The design phase is complete. Construction began in February 2010 and was completed in August 2010.

### **3. Pipeline Inspection and Cleaning**

The Technical Inspection and Wastewater Pipeline Maintenance groups were merged to more efficiently and consistently maintain the wastewater collection system. The work performed by the inspection staff is an important element to the planning and execution of pipeline maintenance work. The inspection tasks are shared by the entire staff and the maintenance workload is prioritized based on inspection data and information.

TIU conducts internal inspections of MWRA structures and pipelines to reveal potential problem areas and identify locations requiring maintenance. Pipeline inspections average about 70% of the workload followed by inspections of other structures and manholes. Approximately 32.67 miles of pipelines were TV inspected in FY10.

Approximately 0.85 miles of Community Assistance inspections were also performed. TIU uses sonar technology to inspect full pipes and structures enhancing our ability to identify maintenance areas.

Pipeline maintenance crews perform a variety of maintenance activities for the MWRA's Wastewater Transport system. The Transport collection system includes 228 miles of interceptor sewer lines. Approximately 42.90 miles of pipeline and 60 siphons were cleaned in FY10.

In addition to general pipeline and manhole repair work performed under this program, the following are other activities pipeline crews perform during the year:

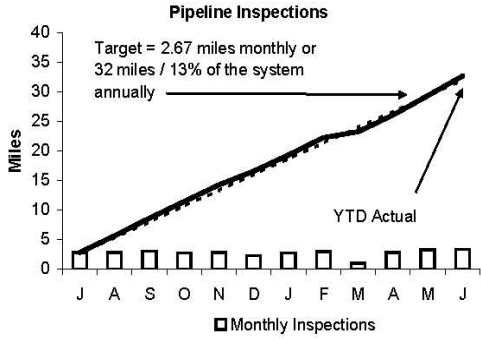
- pipeline spot repair work in shallow excavations
- clear obstructions and clean sections in community lines under the Community Assistance Program
- snow plowing and removal during winter months
- NPDES inspections and best practice management activities
- emergency pumping activities for communities during major wet weather events
- by-pass pumping for contracted pipeline rehabilitation or repairs
- emergency response and overflow monitoring during wet weather events
- response to odor complaints in the system

The attached "Maintenance Pipeline and Structure Inspections and Maintenance" page provides a breakdown of the pipeline inspections and maintenance activities for FY10.

# Wastewater Pipeline and Structure Inspections and Maintenance

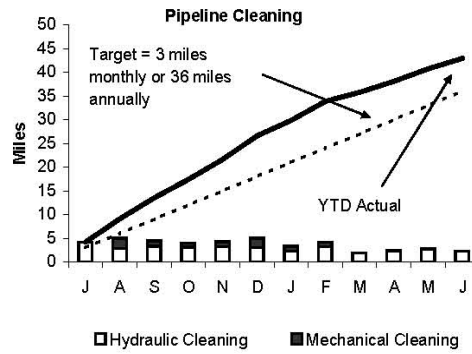
## Yellow Notebook - June 2010

### Inspections



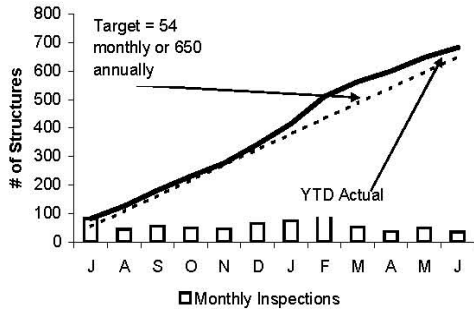
Staff internally inspected 3.33 miles of MWRA sewer pipeline. Community Assistance was provided to the town of Bedford (4,472 linear feet) of sewer was inspected.

### Maintenance



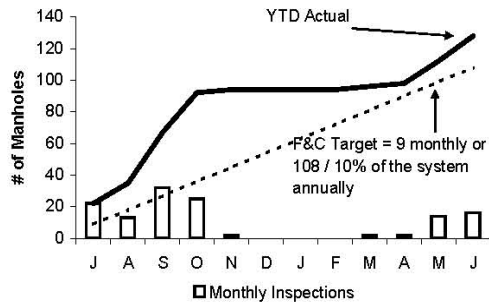
Staff cleaned 2.18 miles of MWRA's sewer system and removed 3 cubic yards of grit and debris. No Community Assistance was provided this month.

### Structure Inspections



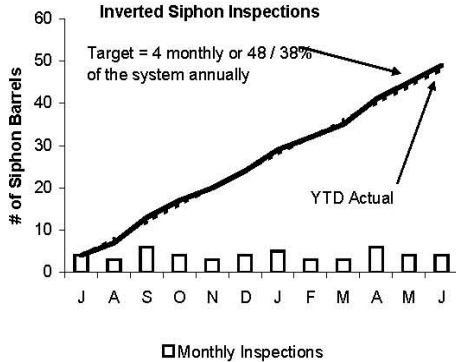
Staff inspected the 12 CSO structures and performed 35 additional manholes/structures this month.

### Manhole Rehabilitation



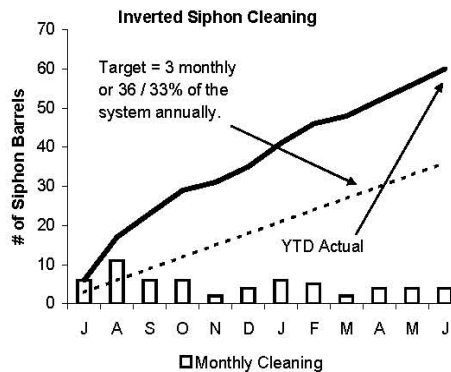
Sixteen (16) frames and covers were replaced this month.

### Inverted Siphon Inspections



Staff inspected four (4) siphon barrels in this month.

### Inverted Siphon Cleaning



Staff cleaned four (4) siphon barrels this month.



## **FY10 Maintenance Program Costs, Staffing and Contracts**

### **1. Budget**

FOD has made a significant commitment to the maintenance of its wastewater system. Additional maintenance and improvement projects are included in the MWRA Capital Program and are identified on an annual basis. A Master Plan is ongoing within the Authority to prioritize projects and to determine required funding needs. The budget below includes only the Current Expense Budget (CEB). Maintenance includes protecting the many assets of the MWRA with individual programs that care for facility interior and exterior elements, maintain plant equipment, inspect and clean wastewater pipelines and structures, plan/schedule and track maintenance activities, manage each program and supervise staff, and provide adequate administrative support. The table below includes a summary of the approved budget in FY10 for programs within FOD for related maintenance activities.

#### **FY10 APPROVED MAINTENANCE ANNUAL BUDGET**

<b>Budget Line Item</b>	<b>Total Funding</b>
Wages and Salaries	\$8,530,573
Overtime	\$352,111
Maintenance (Parts & Supplies)	\$4,390,036
Professional Services	\$180,000
Other Materials	\$248,799
Other Services	\$182,034
<b>Total</b>	<b>\$13,913,553</b>

### **2. Staffing**

A total of 135 employees are included in the chart below. They represent personnel responsible for the maintenance of wastewater transport facilities and pipelines. Unit Supervisors for each trade provide supervision and support in their respective areas: electrical, mechanical, machinists and welding, plumbing, HVAC, painting, and carpentry. Facility Maintenance and Equipment Maintenance are two consolidated programs made up of the mechanic specialists, machinists, metalworkers, welders, plumbers, HVAC specialists, electricians, building & grounds workers, and facility specialists (carpenters, painters, and masons). These groups perform maintenance activities at both wastewater and water facilities.

Work Coordination in FOD provides scheduling and job planning at all water and wastewater facilities, water and wastewater pipeline maintenance, and Western Operations. The Wastewater Pipeline Maintenance and Technical Inspection programs

maintain the collections system for the Transport system only. The staffing represents FY10 average levels for employees reporting to the Chelsea Facility. The table below indicates the amount of staffing available and dedicated to maintenance efforts.

### MAINTENANCE STAFFING LEVELS

Staffing Categories	No. of Staff
Equipment Maintenance Program	
Maintenance Manager	<b>1</b>
Engineers	<b>2</b>
Program Manager/Area Manager	<b>4</b>
Administration	<b>1</b>
Mechanic Specialists	<b>20</b>
Electrical Specialists	<b>11</b>
Plumbers	<b>8</b>
HVAC Specialists	<b>5</b>
Machinists and Welders	<b>5</b>
I&C Specialists (Operations Budget)	<b>1</b>
	<b>58</b>
Work Coordination Group Program	<b>17</b>
Collection System Technical Inspections Program	<b>10</b>
Wastewater Pipeline Maintenance Group	<b>18</b>
Building & Grounds Program	<b>18</b>
Facility Maintenance Program (Carpenters, Painters, Masons)	<b>14</b>
<b>Subtotal</b>	<b>77</b>
<b>Total</b>	<b>135</b>

*Staffing levels may vary as a result of vacancies, transfers, and other factors. This chart provides a number of available staff during the fiscal year for maintaining the collections system and wastewater facilities. Equipment Maintenance, Building & Grounds, and Facility Maintenance programs perform similar core business functions at Water Pumping Facilities and locations.*

### 3. Service Contracts

The Maintenance Program is supplemented by a series of service contracts. These services are intended to provide resources beyond the in-house capabilities of the Maintenance staff. FOD currently utilizes the following service contracts and services, listed below, to supplement the existing workforce and assist with maintenance projects at wastewater facilities.

<u>CURRENT SERVICE CONTRACTS</u>
Elevator Maintenance
Crane Maintenance
Hydraulic Equipment Maintenance
Instrumentation Maintenance
Fuel Storage Tanks
Fire Alarm and Sprinkler
Air Compressor Service
Boiler and Water Heater
Pest Control Services
Trash Removal
Electrical Testing
Grounds keeping
Lube Oil Analysis
Union Park Station Operation and Maintenance

## **Wastewater Transport Equipment Maintenance**

### **1. Annual Report**

The Field Operations Department Equipment Maintenance page for key indicators of performance for FY10 is attached. Monthly maintenance data is shown under six headings.

- Operations Light Maintenance PM Hours – In an effort to free up maintenance staff to complete more detailed and complex maintenance, operations staff have been committed to completing a number of the routine monthly preventative maintenance tasks. These tasks generally consist of observation and light maintenance tasks. The industry benchmark is 10% - 15% of the total preventative maintenance hours. In FY 10 operations staff completed an average of 387 hours per month which accounted for 19% of the total preventative maintenance hours.
- Overall Preventive Maintenance – The preventive maintenance work orders are completed by both operation and maintenance staff. The goal for FY10 was to complete 100% of all preventative maintenance work orders. The average pm completion for FY10 was 97%.
- Time In Maximo – To ensure accurate data in the Maximo database, 8 hours of staff time per day must be entered into Maximo. The goal is 100%. The average for FY10 was 100%.
- Operations Light Maintenance % PM Completion – In an effort to free up maintenance staff to complete more detailed and complex maintenance, operations staff have been committed to completing a number of the routine monthly preventative maintenance tasks. The goal for operations staff is to complete 100% of the preventative maintenance work orders. In FY10 operations staff completed an average of 96% of the work orders.
- Maintenance Backlog in Crew Hours - Backlog is determined by totaling the planned craft hours in open work orders and comparing them to craft resources available. The FY10 backlog average was 11,411 hours which remains within the industry standard of 6,130 to 12,260 hours.
- Overtime Spending – Maintenance overtime spending was \$100,000 over budget for FY10. The overtime was used to support call ins for emergency maintenance and planned overtime. It was also used for emergency coverage and maintenance coverage related to the record rainfall in March 2010.

In addition to these monthly performance indicators Field Operation's staff also tracks the following:

### **2. Critical Equipment Availability**

The average equipment availability for FY10 – 99.9 %. An equipment availability report is generated daily that details the critical equipment required to collect and transport the wastewater flow at the facility design capacity. Higher maintenance priority is given to equipment that drops below the number required. No operational impact has occurred in the past year because of the high daily equipment availability.

## **Annual Status Sheets – Fore River Pelletizing Plant**

July 2009 - June 2010

Critical Equipment Availability:      Twelve Month-Average – 75 %

Operating logs indicate that an average of 9 of the 12 centrifuges were available during FY10. The centrifuges and ancillary equipment make up the critical components at the Pelletizing Plant because sludge can be processed through the Dryers or it can be sent to a landfill via the by-pass system. At this time, 9 centrifuges are available, giving the plant more than enough capacity to process current flows from Deer Island. The facility is currently operated on a 5-day workweek, ceasing operations most weekends.

Backlog:

The current maintenance monitoring software does not track craft hours, but it is estimated that the outstanding work orders could be completed in approximately one week.

Work Orders:

In FY10, staff completed 2,018 or about 93 % of the 2173 work orders that were opened.

Equipment Replacement:

Approximately \$1,569,000 was spent on replacement parts and maintenance related items during this period, including, but not limited to:

- Overhaul of Process Trains 3 and 5
- Replacement of Mixer Feed B Screw on Trains 3 and 5
- Replacement of Separator B Screw on Train 2
- Dryer drum rebuild on Trains 1, 3, and 4
- Complete overhaul of Rotating Assemblies on Centrifuge Nos. 2 and 4
- Regenerative Thermal Oxidizer Nos. 1 and 4 media replacement
- Completed installation of new process baghouses on all Trains